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ABSTRACT

Intended as an instructional guideline, the last of three reports on taxonomic instruction explains strategy development and use in instruction. The instructional content is reading, with a target population of emotionally disturbed, underachieving students. Strategies are defined as instructional actions resulting from a process of experimentation and hypothesis testing by the teacher. The taxonomy is intended, therefore, as an organizing index for instructional behavior of teachers. The content of reading is described as being divided into basic skills, basic subskills, and sequential levels. The reading instruction strategy is described as composed of settings of student grouping, modes of instruction, sensory modality input channels for a student's reception of information, and sensory modality output channels for a student's expression of information. Each aspect of instructional strategies is explained with examples of taxonomic strategies. Achievement of individualization and personalization in strategies is then explained. Included are different tests and observations used in strategy formation. Then four case studies are presented illustrating the decision making process in strategy formation. Concluding is a discussion on relationship of strategy use and formation to computer assisted instruction. (See also EC 040 216 and EC 040 217.) (CB)

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# THE TAXONOMIC INSTRUCTION PROJECT

## A MANUAL OF PRINCIPALS AND PRACTICES PERTAINING TO THE STRATEGIES OF INSTRUCTION

EC 040 218

August 1970

Research and Demonstration Center
for the Education of Handicapped Children
Teachers College, Columbia University
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# THE TAXONOMIC INSTRUCTION PROJECT

Project Director
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## A MANUAL OF PRINCIPALS AND PRACTICES PERTAINING TO THE STRATEGIES OF INSTRUCTION

A Collaborative Effort of Joseph Brodack, Nancy Dworkin, Shirley Goldwater, Gerald Jorgenson, Sandford Reichart, Patrick Schifano, and Abraham J. Tannenbaum.

Research and Demonstration Center
for the Education of Handicapped Children
Teachers College, Columbia University
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August 1970

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The Gates-MacGinitie Reading Tests, (New York: Teachers College Press), 1964.

Dolch Basic Sight Word Test, Part I (Edward W. Dolch, Ph.D., Champaign, Illinois: Garrard Publishing Company), 1942.

Wepman Auditory Discrimination Test, Form I, (Joseph H. Wepman, Ph.D., Chicago, Illinois), 1958.

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## FOREWORD

In December, 1969. the first report of the Taxonomic Instruction Project was presented. The substance of that manual dealt with the *content* of instruction. As such, it dealt with just one phase of the total project. The following manual is the second, and in many ways more difficult, phase. Its substance is that of the *strategies* of instruction.

The staff philosophy is reflected throughout the manual and is projected in the hope that it can set the course for conscious actions on the parts of all teachers as they pursue the decision making process in search of alternative behaviors adjusted to suit individual learner needs.

The manual attempts to indicate what is done with the diagnoses of students, how strategies are determined, how decisions are made, what some of those decisions have been, and how they have been related to some real problems and affected children meaningfully.

This is just one course we are certain. We offer it as such. We would like to believe that it might be catalytic. We offer it as an argument and would like to believe that it might become part of a dialogue. It is not an answer. It is a way of working, a way of thinking, a way of believing and of behaving. It is one way alone. As such, it has proved helpful to those of us who are a part of the Taxonomic Instruction Project. It has given us many hours of questioning and has provided us with many hours of satisfaction as well.

Ahead are many more courses we must follow. There is need for much research on Instructional Setting and Mode, on interaction effects, on diagnostic evaluation and on preferred Sensory Modality Input and Output. We have plans to research each of these areas and to investigate the interactions between Sensory Modality Input and Instructional Mode.

Above all, we intend to continue to study the implications of our project to teacher education and to technological interpretations.

Our work would not have been possible without the combined effort of many people. I acknowledge these with deep appreciation and with high personal esteem: Dr. Leonard S. Blackman, Director of the Research and Demonstration Center, Dr. Frances P. Connor, Chairman of the Department of Special Education, Dr. Abraham J. Tannenbaum, Director of the Project, Miss Sandra Collison of the Research and Demonstration Center and the staff who worked with me with patience and with dedication. They are more than colleagues; they are friends and they are the project as well. They are: Mrs. Shirley Goldwater, project supervisor, Mr. Joseph Brodack, Mrs. Nancy Dworkin, Mr. Gerald Jorgenson and Mr. Patrick Schifano. Also, I would like to thank our researcher, Miss Priscilla Jean, our secretary, Mrs. Heddy Schlackman and Mr. Yehoash Dworkin who helped with the work on the computer. Last, and not in order of importance, the project staff joins me in expressing our appreciation to Dr. Albert Budnick and his devoted teachers at P.S. 9, Queens, without whom our project would not have had a home. We welcome the addition to our staff of Dr. Susan Gershman and Mrs. Joan Martin for the school year 1970-1971.

The Taxonomic Instruction Project has become a way of life for all those connected with it. We hope we have communicated some of this.

**Sandford Reichart**
**Associate Director**

# CHAPTER I

## THE TAXONOMIC INSTRUCTION PROJECT: AN OVERVIEW

The main objective of this chapter is to present an overview of the emphases and working principles of the Taxonomic Instruction Project. To do this, it is necessary to indicate the focus of the project prior to its implementation in the present school, and to indicate how and why the focus changed. With this as background, it will be possible to describe the focus of the project during the 1968-1969 school year as the substance (content) of instruction was being clarified. The project's first report, *The Taxonomic Instruction Project: A Manual of Principles and Practices Pertaining to the Content of Instruction,*[1] was an explication of that effort.

Another objective of this chapter is to indicate the focus of the work during the 1969-1970 school year. This work involved the clarification of the strategy component of instruction and the establishment of the principles that undergird the decision making process as strategies are formed. This chapter will first present the general nature of the process and then indicate how the remaining chapters will further explicate it.

### *HISTORY OF THE PROJECT: 1966-1968*

The Taxonomic Instruction Project began during the 1966-1967 school year. During that year, the two staff members of the "Self-Instruction Reading Project," a field research project funded by Teachers College, Columbia University, were based at P.S. 148, Manhattan, a school for emotionally disturbed, socially maladjusted boys. The purpose of the project was to develop teaching techniques and materials uniquely suited to the special population of the school.

During the year, the two staff members worked with three language arts teachers in the school. For two or three periods a day, the teachers and project staff members developed original materials, modified existing materials, diagnosed the social and academic needs of the students, and explored a variety of teaching techniques. Throughout the course of the year, the staff members became an integral part of the three classrooms, in assisting as well as advising the teachers.

During that first year of the project, a variety of materials and techniques were developed and tested. These new approaches were grounded in the realms of both theory and practice and consequently had a variety of sources. As the number of successful experiences increased, it became obvious that a classification framework was needed to organize both the theoretical and applied aspects of what was being done. This was provided by Dr. Abraham J. Tannenbaum, Project Director, who developed a classification system known as the Taxonomy of Instructional Treatments.

The Taxonomy was, and is, a model for the teaching of reading. The *content* of reading was divided into Basic Skills, Basic Subskills, and Sequential Levels; these components were labelled the *What* of instruction. The *strategy* of reading instruction was divided into Settings of Student Grouping, Modes of Instruction, Sensory Modality Input channels for a student's reception of information, and Sensory Modality Output channels for a student's expression of information; these were labelled the *How* of instruction. The Taxonomy, therefore, was a classification system consisting of seven basic components. Each of the

[1] Research and Demonstration Center for the Education of Handicapped Children, Teachers College, Columbia University, New York, New York, *The Taxonomic Instruction Project: A Manual of Principles and Practices Pertaining to the Content of Instruction* (New York: Teachers College, Columbia University, 1969), U.S.O.E. Report.

seven was then divided so that any instructional act of a teacher could be classified as to what Basic Skill, Basic Subskill, Sequential Level, Grouping Method, etc., was being utilized during a discrete period of time. By using the Taxonomy as a framework for instruction, a teacher could test different techniques coherently and keep track of successful methods and materials. For example, a teacher could vary individual components of the Taxonomy and achieve an individualized program for any one student or group of students in the class.

The evolution of the Taxonomy of Instructional Treatments was the most significant development made during and immediately following the first year of the project. However, an additional change was made regarding the emphasis of the project staff. During the project's first year, the teachers and staff worked cooperatively in the classroom, but during the second year, 1967-1968, the staff attempted to instruct the teachers in the use of the Taxonomy by conducting a series of conferences. In other words, the staff withdrew from the classrooms and took on more of an advisory and teacher-training role.

The attempt to train teachers to be skillful users of the Taxonomy during that second year was, to a large degree, unsuccessful. Although the teachers "learned" the Taxonomy, it was learning in a mechanical way; the teachers could use the terminology of the taxonomic system but they had difficulty transferring that understanding to classroom application.

After two years, therefore, two significant events in the life of the project had occurred. The first, and most important, was the development of the model for reading instruction (the Taxonomy of Instructional Treatments). The second was the development of guidelines for instituting the use of the Taxonomy in the classroom. Since the exclusive use of conferences during the first year had been found wanting, conferences were supplemented by demonstrations in the classroom and with individual children. In a sense, the best aspect of the first year, a cooperative classroom arrangement with the teacher, was combined with the conferences used during the second year to form a situation in which a teacher would have maximum opportunities to become adept at using the Taxonomy.

## *EMPHASES OF THE TAXONOMIC INSTRUCTION PROJECT*

The Taxonomy of Instructional Treatments is intended to be an organizing index for the *instructional* behavior of teachers. The definition of instruction (engaging a pupil in learning basic reading skills and concepts) was developed as only one aspect of *teaching* which also involves cultivating supportive, ego-building, interpersonal relationships; evoking productive intellective processes; and developing reward and feedback mechanisms for behavior control. In the project, the definitions of instruction and teaching are separated since the emphasis is on instruction as a means to the broader ends of teaching. Of course, this emphasis does not belittle "reward and feedback mechanisms" or "supportive, ego-building, interpersonal relationships." Rather, it supports these aspects and chooses a particular channel for achieving them.

A fundamental hypothesis being tested is that a teacher's ability to regulate engagement (a pupil's response and attention to instructional stimuli) has both therapeutic and scholastic value. For example, a student who is engaged in instruction will, over time, show an improvement in behavior. A further hypothesis is that for each pupil, there is a unique set of tactics best suited to control engagement at a given moment. The instructional role of the teacher is one of achieving a "goodness of fit" between a pupil's functional capacity and learning style on one hand and the organization of the content and strategy of instruction on the other.

The achievement of the proper match between the student and content and the strategy of instruction is called individualization, the immediate goal of instruction. The

ultimate goal, beyond individualization, is personalization of instruction. In personalization, the emphasis is on increasing the student's ability to function in a variety of instructional settings, instructional modes, instructional inputs and outputs. To reach this goal, the proper match is systematically varied to maximize the student's reception of instruction.

## *THE TAXONOMY AS A MODEL FOR INSTRUCTIONAL BEHAVIOR*

The Taxonomy of Instructional Treatments is a model with two functions: first, that of moving to and through individualization of instruction; and second, that of progressing from individualization to personalization. It takes into account the teacher's function in (a) organizing instructional content logically and sequentially; (b) transmitting instructional stimuli through any of the pupil's receptive sensory modalities; (c) eliciting responsiveness through any of the pupil's expressive channels of communication; and (d) mastering the total range of instructional modes (or styles) and settings (pupil grouping arrangements) available for utilization.

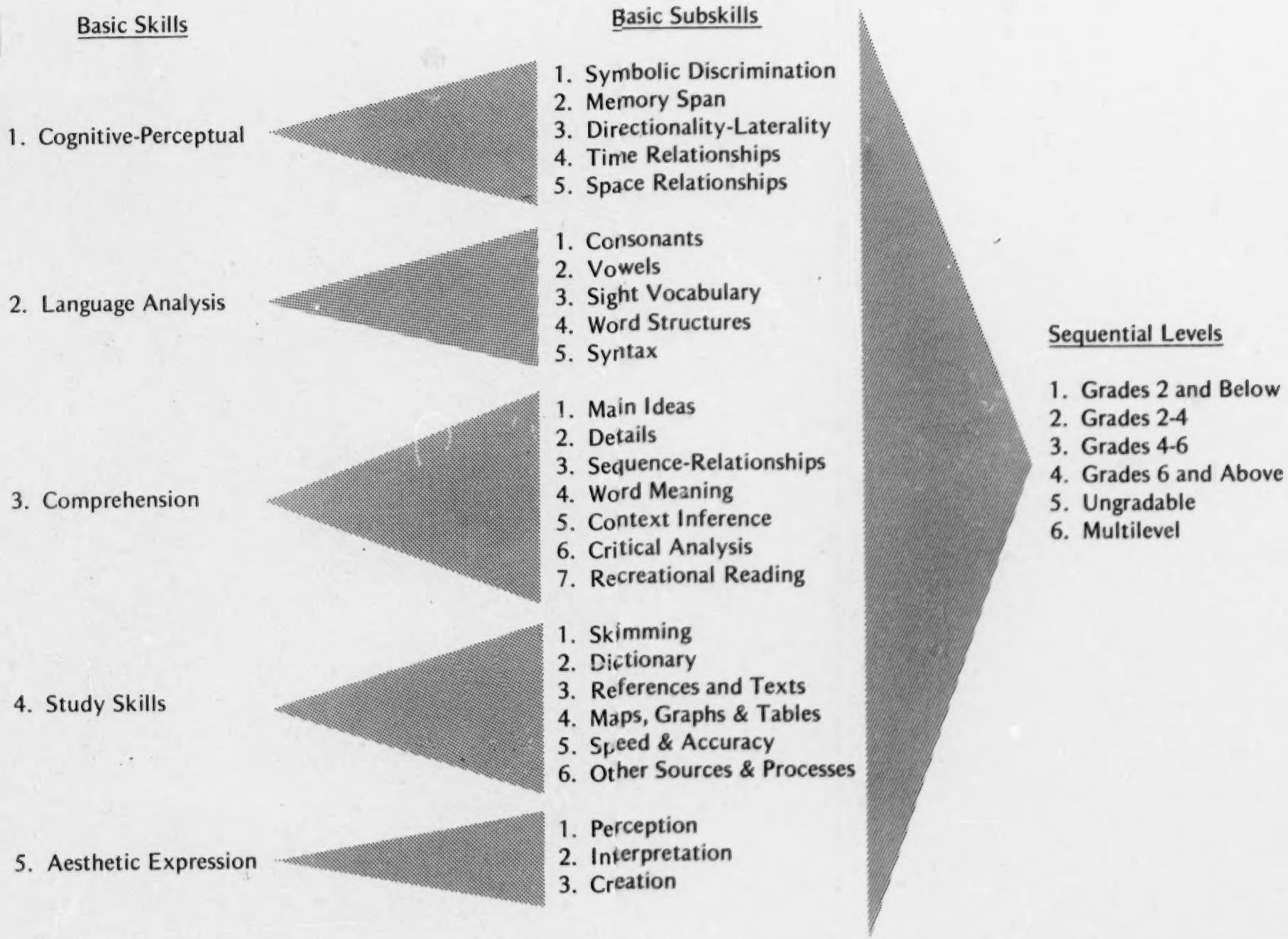
## *THE WHAT OF INSTRUCTION*

In the Taxonomy, a distinction is made between the *What* and the *How* of instruction. The *What* deals with the content that is to be transmitted. There are three dimensions in the content: Basic Skills, Basic Subskills, and Sequential Levels. The content is presented schematically in **Figure 1.**

With respect to this aspect of the Taxonomy, instructional material (the emphasis of a lesson) could be coded as to what Basic Skill, Basic Subskill, and Sequential Level best describe it. For example, one student might be working in the Language Analysis area (Coded 2), emphasizing the Basic Subskill of the sounds of consonants (Coded 1), which is at the Grade 2 and Below Sequential Level (Coded 1).

FIGURE 1

THE WHAT OF INSTRUCTION



## *THE HOW OF INSTRUCTION*

The Taxonomy is a classification system for the *How* as well as the *What* of instruction. The *How* of instruction refers to the teaching strategy used in presenting content. There are four basic components in this aspect of the Taxonomy: Instructional Setting, Instructional Mode, Sensory Modality Input, and Sensory Modality Output, each of these being further divided. Schematically, this aspect of the Taxonomy is presented as follows:

| Instructional Setting | Instructional Mode | Sensory Modality Input | Sensory Modality Output |
|---|---|---|---|
| 1. Teacher–Student | 1. Play–Puzzle | 1. Kinesthetic | 1. No Response |
| 2. Student Self–Instruction | 2. Play–Chance | 2. Auditory | 2. Motoric Response(Gestures & Movement) |
| 3. Student–Student (Parallel) | 3. Play–Competition | 3. Auditory–Kinesthetic | 3. Vocal Response |
| 4. Student–Student (Interactive) | 4. Test–Response | 4. Visual | 4. Motoric Response (Marking & Writing) |
| 5. Teacher–Small Group | 5. Role Playing | 5. Visual–Kinesthetic | 5. Vocal–Motoric Response |
| 6. Student–Small Group | 6. Exploration | 6. Auditory–Visual | |
| 7. Teacher–Total Group | 7. Programmed Response | 7. Visual–Auditory–Kinesthetic | |
| 8. Student–Total Group | 8. Problem Solving | | |
| | 9. Exposition | | |

By using these four components, one is able to categorize the strategy aspects of instruction. For example, a student may be working with the following content:

| | | | |
|---|---|---|---|
| Basic Skill | – | Language Analysis | (2) |
| Basic Subskill | – | Consonants | (1) |
| Sequential Level | – | Grades 2 and Below | (1) |

Further, he may be using the following strategy as he works with the content:

| | | |
|---|---|---|
| Instructional Setting: | Teacher–Student | (1) |
| Instructional Mode: | Test–Response | (4) |
| Sensory Modality Input: | Auditory–Visual | (6) |
| Sensory Modality Output: | Vocal | (3) |

## *THE WHAT AND THE HOW OF INSTRUCTION: WORKING WITH THE TAXONOMY*

To recapitulate, there are seven components in the Taxonomy of Instructional Treatments. By referring to the Taxonomy, one may not only gain a comprehensive picture of a teacher's instructional behavior but also the teacher may use the Taxonomy in planning instruction. For example, diagnostic test data may reveal that pupil A has a language analysis problem (Basic Skill 2), specifically in sight vocabulary (Subskill 3). He can handle early primary grade material (Sequential Level 1) and is responsive to visual, auditory, and kinesthetic inputs (Sensory Modality Input 4, 2, and 1). He is comfortable in making vocal responses (Sensory Modality Output 3); his interest is aroused by such teacher tactics as games of chance or puzzle play (Instructional Modes 2 and 1); and he feels most comfortable in a teacher-directed small group or when engaged in self-directed activities (Instructional Settings 5 and 2). For this hypothetical student, the instructional "prescription" would look as follows:

| Basic Skill | Basic Subskill | Sequential Level | Instructional Setting | Instructional Mode | Sensory Modality Input | Sensory Modality Output |
|---|---|---|---|---|---|---|
| 2 | 3 | 1 | 5 | 2 | 4 | 3 |

By using such an approach, the teacher could design lessons uniquely suited to individual students in the class; individualized, diagnostic, prescriptive instruction could be the result. The teacher would have specific guidelines for diagnosing learning needs and styles and for analyzing what materials and methods would be most appropriate. Thus, the teacher's stylistic repertoire would be systematized as the behavioral alternatives open to him were classified.

*IMPLEMENTING THE TAXONOMY OF INSTRUCTIONAL TREATMENTS: 1968-1969*

A new site, P.S. 9, Queens, was chosen as a base for the project for the 1968-1969 school year. This school had a student population similar to that of P.S. 148, i.e., emotionally disturbed, socially maladjusted, fifth through eighth grade boys. It was at this school that the formalized Taxonomic Instruction Project was to receive its initial field-testing.

Specific guidelines for working with teachers had been developed during the two years prior to the 1968-1969 school year. These included the following eight steps:

1. **Identification of the Problem**
   Diagnosis through testing, individual and group; formal and informal; description of child in terms of test results.

2. **Teamwork for Individualization**
   Procedure between teacher and researcher to develop long-range lesson plans and individual prescriptions.

3. **Demonstrations**
   Field-testing by researcher or teacher of individual prescriptions within classroom or, if need be, outside of classroom.

4. **Evaluation**
   Analysis of the effectiveness of remediation based on observation of student behavior in the classroom and teacher feedback.

5. **Refinement**
   More definitive description of child in terms of his revealed strengths and weaknesses.

6. **Examination**
   Search through the reservoir of content and strategies for a "goodness of fit" for each child.

7. **Personalization**
   Step following successful individualization in which the child uses his strengths to minimize his weaknesses within new settings.

8. **Post-Testing**
   Means by which the child's growth can be assessed.

Step 1, diagnosis, included the use of a staff-made diagnostic reading test, the Gates-MacGinitie Reading Test, the Wepman Auditory Discrimination Test, and a variety of informal tests, such as the Dolch Two-Hundred and Twenty Most Frequently Used Words Test.

Steps 2 and 3, teamwork for individualization and demonstrations, reflected the dual nature of implementing the Taxonomy; both teacher-conferences and demonstrations by the staff were used to develop and field-test experimental prescriptions.

Step 4, evaluation, was carried out by using a formal, staff-developed observation schedule which revealed the amount of time an individual student was engaged in instructional activity in the classroom. This was supplemented by the teacher's perception of how well the prescription worked, and led, over a period of time, to steps 5 and 6, refinement and examination. The goal was to find the prescription, or prescriptions, that most effectively engaged the student. Once effective engagement was taking place, step 7, personalization, was instituted. At this level, prescriptions were varied consciously to give the student experience in functioning in situations that were hitherto uncomfortable or impossible for him to handle. The goal was to give the student the ability to function in a variety of settings with a variety of materials besides the ones which experience had previously shown would engage him, i.e., to personalize instruction.

## *DEVELOPING CONTENT*

The implementation of the Taxonomy was facilitated by the use of a wide variety of instructional materials. For example, if a staff member and a teacher decided on a particular prescription for a child, there had to be both materials and suitable techniques immediately available. Furthermore, each of the areas subsumed under the *What* of instruction had to be organized logically in order to insure that a student, once his reading difficulties had been identified, would be given a prescription on a continuum of difficulty that had the best chance to improve his functioning level.

Accordingly, each of the Basic Skills of the Taxonomy (Cognitive-Perceptual, Language Analysis, Comprehension, Study Skills, and Aesthetic Expression) was broken down into a logical sequence as a progression of tasks. What resulted was a reservoir of techniques and materials that the teacher could refer to as lessons were planned.

In addition, specific types of materials were needed and then collected. Some aspects of the Taxonomy, such as the Basic Skill of Language Analysis, had few commercial materials that lent themselves to a variety of Sensory Modality Inputs. Therefore, the staff developed the appropriate types of materials.

## *CLASSIFYING MATERIAL*

To make the materials readily available to the staff and teachers, a cataloguing system was developed. Each piece of material was catalogued according to the first three digits of the Taxonomy. For example, if a game stressed the sounds of consonants, it was catalogued as Basic Skill 2, Basic Subskill 1, and Sequential Level 1 (2,1,1) (See Appendix D). This number and a description of the material was then placed on an index card and the material itself was stored in the Materials Resource Room. Once a student's needs had been diagnosed, appropriate materials, in terms of the *What* of instruction, were immediately available through this indexing system.

## *RECAPITULATION OF THE SCHOOL YEAR: 1968-1969*

During the 1968-1969 school year, the staff of the Taxonomic Instruction Project emphasized the clarification of the two aspects of the Taxonomy: the *What* and the *How* of instruction. As a model for the instructional behavior of teachers, the Taxonomy demanded the creation and/or assembling of instructional materials that would provide appropriate content for every possible teaching style. This was the primary task for the year.

By the end of the school year, the *What* of instruction was an operating concept. The sequential nature of the Basic Skills, Subskills, and Sequential Levels had been explicated and a variety of techniques for using content had been collected, catalogued and then used as an available reservoir of materials for the teacher.

During the 1968-1969 school year, the *How* of instruction received limited attention as compared to the *What* of instruction. Hence, during the 1969-1970 school year, the *How* of instruction became the major focus of the project.

## *IMPLEMENTING THE TAXONOMY OF INSTRUCTIONAL TREATMENTS: 1969-70*

The eight steps, previously described for implementing the Taxonomy in classrooms, remained the same during the 1969-1970 school year. In addition, the content of instruction, the *What* of the Taxonomy, had been developed to the point where it was an established principle. What remained to be done, and what focused the work during 1969-1970, was a refinement of the strategy component of instruction (the *How* of the Taxonomy) and the development of the principles of instruction that operated in the selection of a strategy.

## *DEFINITION OF A STRATEGY*

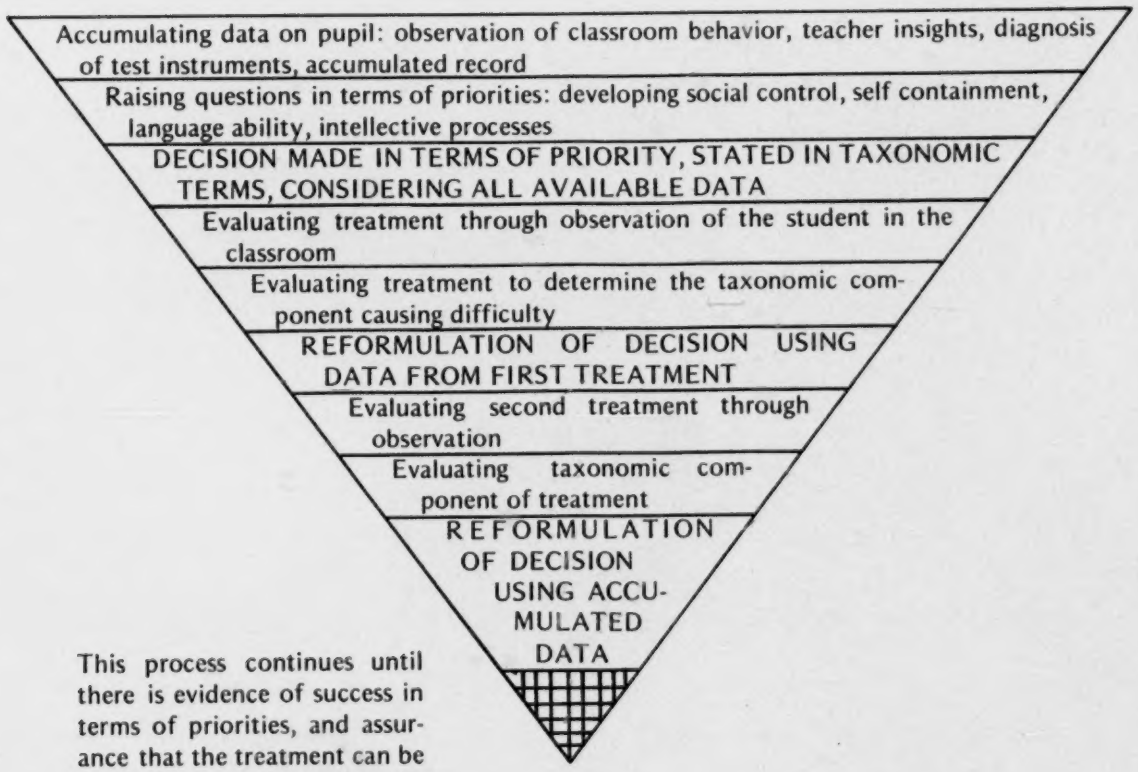
Strategies are the instructional actions that result from a process of experimentation and hypothesis testing on the part of the teacher and/or person concerned with instruction. A strategy demands a conscious selection of the components of instruction as stated in taxonomic terms and assurance that the selected strategy will be successful in achieving the end for which it was chosen. For example, a student may be disruptive in a group instructional setting and be unable to engage himself in instructional activity. The teacher, through diagnostic testing, may know that the student needs work in the Basic Skill of Language Analysis (Coded 1), particularly in the Basic Subskill of Sight Vocabulary (Coded 3), on the Sequential Level Grades 2 and Below (Coded 1). The *content* of instruction (the *What* of the Taxonomy) is therefore relatively fixed. At this point, the teacher begins a period of experimentation. Using the last four components of the Taxonomy, prescriptions

are written based on data that is available on the student. For the disruptive student who cannot engage himself in instructional activities, the initial trial might involve the following components: 2, 1, 4, 4. In this instructional treatment, the 2 refers to the Instructional Setting of Student Self-Instruction; the 1 refers to the Instructional Mode of Play—Puzzle; the 4 refers to a visual Sensory Modality Input; the final 4 refers to a motoric Sensory Modality Output. In other words, the *What* of instruction is a consciously chosen "package" made up of the components of the *How* of instruction. The package is field-tested with the student and then evaluated in terms of how successful it is with the student. If it is successful, that is if the student is engaged in the activity, it is continued. After repeated trials, it would *become* a strategy if it were consistently successful with the student. If it were not successful, the treatment would be analyzed. An attempt would be made to determine which component of the Taxonomy caused the difficulty: Instructional Setting, Instructional Mode, Sensory Modality Input or Sensory Modality Output. All relevant data, practical and theoretical, would be brought to bear to determine which taxonomic component should be changed. A new prescription would be written using other taxonomic variables and this would then be field-tested.

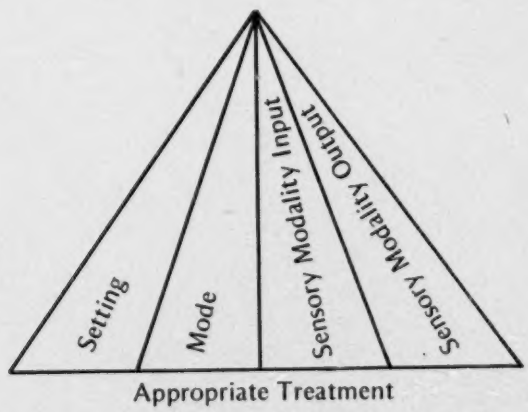
This process of prescribing, field-testing, evaluating, and then reformulating the prescription continues until there is success in engaging the student in instructional activities. A strategy is formed when, over a period of time, a student continues to be engaged in instruction and when the teacher can choose that strategy and have assurance that the student will respond in expected fashion.

A student is responding suitably when progress is being made toward one, or all, of four priorities: social control, self-containment, language development, and cognitive patterns. Strategies might be developed for one of these priorities, such as social control, or for more than one, such as social control and language development.

Schematically, the process of forming a strategy is as follows: *(See figure, following page)*


Accumulating data on pupil: observation of classroom behavior, teacher insights, diagnosis of test instruments, accumulated record
Raising questions in terms of priorities: developing social control, self containment, language ability, intellective processes
DECISION MADE IN TERMS OF PRIORITY, STATED IN TAXONOMIC TERMS, CONSIDERING ALL AVAILABLE DATA
Evaluating treatment through observation of the student in the classroom
Evaluating treatment to determine the taxonomic component causing difficulty
REFORMULATION OF DECISION USING DATA FROM FIRST TREATMENT
Evaluating second treatment through observation
Evaluating taxonomic component of treatment
REFORMULATION OF DECISION USING ACCUMULATED DATA

This process continues until there is evidence of success in terms of priorities, and assurance that the treatment can be used successfully. At this point the treatment becomes a. . . . .STRATEGY




Strategies, therefore, are consciously chosen aspects of instruction that are successful in meeting the priorities of instruction. A teacher's instructional behavior becomes a strategy when, over a period of time, the components of instruction are successful in engaging the student, and when the engagement leads to progress in realizing the priorities for which the instruction was chosen.

## *THE DECISION MAKING PROCESS: FORMING A STRATEGY*

The formulation of a strategy requires constant decision making on the part of the individual concerned with the instruction of the student. As a strategy is formed, questions are raised relative to the student's functioning, and the answers are given in terms of a taxonomic treatment, i.e., the taxonomic variables that make up the *How* of instruction. The taxonomic treatments become strategies when they are successful both in engaging the student and meeting priorities, i.e., when the "right" answer in terms of instruction has been found (a strategy that "fits" the student has been discovered).

The questions that are raised and the answers that are generated for particular students

are not random. Particular types of questions are raised, starting with the data that is available on each student in a class, and different kinds of questions are raised and answered as the taxonomic treatments become refined as strategies. In general, the questions first relate to the strengths of the student, i.e., an attempt is made to relate the *How* of instruction to what he can do rather than what he has difficulty with. This determination is made by considering all available information about the student and includes everything from the hunches of the teacher to the information available in the records of the school psychologist. As the various taxonomic treatments are tested and evaluated, the student's preference for and reaction to the treatments takes its place as data and is used to further refine the types of questions asked and types of treatments prescribed. Ultimately, the level of a strategy is reached, at which point the decisions pertaining to a strategy are buttressed by the collective data generated by previous taxonomic treatments.

## *THE DECISION MAKING PROCESS: INDIVIDUALIZATION AND PERSONALIZATION*

As has been stated, there is a difference between individualization and personalization of instruction. Individualization refers to the finding of the proper "match" between strategy and student and results in the student's engagement in instructional activity. Personalization follows individualization and refers to the varying of the components of a strategy to give the student practice in functioning in situations that were, for him, hitherto uncomfortable. For example, a disruptive student who cannot function in large group instruction may reach the individualized stage with the following strategy: Instructional Setting: Student Self-Instruction (2); Instructional Mode: Play—Puzzle (1); Sensory Modality Input: Visual (4); Sensory Modality Output: Motoric (2). The ultimate social goal for the student would be to function in a large group. Personalization, rather than individualization, would be the process for reaching that goal. A teacher would decide which component of the taxonomic strategy to vary, while keeping the rest of the Taxonomy stable. If, for example, the Instructional Setting was to be varied, the progression of strategies hypothetically leading toward social control might be as follows:

| | Setting | Mode | Sensory Modality Input | Sensory Modality Output |
|---|---|---|---|---|
| Strategy | 2 | 1 | 4 | 2 |
| Trial 1 (Evaluation) | 1 | 1 | 4 | 2 |
| Trial 2 (Evaluation) | 3 | 1 | 4 | 2 |
| Trial 3 (Evaluation | 5 | 1 | 4 | 2 |
| Trial 4 (Evaluation) | 7 | 1 | 4 | 2 |

Of course, each trial would take place over an adequate period of time to allow the student to become accustomed to each new setting. Also, the final three components of the strategy would remain stable, hence familiar to the student in order to control the amount of novelty that would operate during each trial.

A strategy, then, is a pragmatic tool that works to engage a student in the individualization of instruction. As such, it capitalizes on a student's strength and preferred ways of working. However, a further goal of the Taxonomy is personalization. In the personalization process which deals with the weaknesses of a student, the components of the strategy are varied to give the student the opportunity to function in settings that have been difficult for him. A strategy in this sense is dynamic. It is the instructional act that is successful with a student and the tool that can be consciously varied to enable the student to become a fully functioning individual.

## *RECAPITULATION AND FORMAT OF THE PRESENT VOLUME*

Strategies are consciously chosen aspects of instruction that are successful in meeting the priorities of instruction. Furthermore, there is a rational process of decision making that leads to a strategy. Once a strategy is formed, conscious manipulation of that strategy provides the student with experiences in activities that were previously difficult for him to participate in. The delineation of this process, the formulation of a strategy and its manipulation in instruction are the focus of this volume.

Chapter 2 provides a deeper definition of a strategy than was possible in this introductory chapter. Each aspect of the *How* of instruction is defined, examples of taxonomic strategies are given, and the emerging hierarchical order of the *How* of instruction is listed.

Chapter 3 treats the decision making process that is involved in the formation of strategies and describes how individualization and personalization are achieved. Included are the different tests and observations that are used as well as the questions that are raised to generate strategies of instruction.

Chapter 4 is the presentation of four case studies that illustrate the decision making process involved in the formation of strategies.

Chapter 5 describes how the Taxonomic Instruction Project, particularly the formation and use of strategies of instruction, lends itself to teacher training and Computer Assisted Instruction.

## CHAPTER II

## STRATEGY: THE HOW OF INSTRUCTION

The objectives of this chapter include: a definition of strategy in terms of the *How* of instruction; illustrations of strategies; a brief delineation of the development of strategies as they evolve from the project's decision making process of diagnosis, prognosis, analysis and evaluation of pupil learning patterns; a presentation of strategies within the conceptional framework of individualization and personalization of instructional treatment; the presentation of a strategy as a conscious choice that can address itself to one aspect, various aspects or all aspects of pupil learning behaviors; and specific examples of activities within the framework of the Instructional Mode.

In the broadest sense, the selection of a strategy consists of conscious decisions on the part of the teacher that seek to determine the means of effectively transmitting information in terms of the pupil's preferred learning style. A strategy is viewed as the method of negotiating the message from transmitter (teacher) to receiver (student). A conscious selection based on previous diagnostic instruments (formal and informal), teacher feedback, cumulative files, staff observations and the investigatory system provided by the Taxonomy is crucial. When the teacher utilizes a strategy, he must make a conscious decision regarding what instructional style should be used so that information may best be imparted to a student or group of students. If this instructional style is not favored by the teacher, he must put aside his own preferences of instruction and use those styles which are appropriate for a specific child.

Strategies may be evaluated in terms of a student's expected learning behaviors, suitable behaviors, unexpected behaviors, and unsuitable behaviors. For example, if the student's behavior is expected and suitable, the outcome is individualization of instruction and there is no observable frustration. If the student's behavior is expected and unsuitable, the first outcome of personalization of instruction occurs and the student is slightly frustrated in the academic task. If the student's behavior is unexpected and unsuitable, the second outcome of personalization occurs with frustration. If the student's behavior is unexpected and suitable, complete personalization is established and the Taxonomic Instruction Project has achieved one of its goals.

A strategy is viewed in terms of the *How* of instruction, that is, the last four taxonomic components which include Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output. These last four taxonomic components make up the means of transmitting the content. **(See Appendix A.)**

When individualization[1] of content (the *What* of instruction) and individualization of the means of transmission (the *How* of instruction) is achieved, the child is in an instructional situation where he is least frustrated. When individualization of content is held constant and the last four taxonomic components are systematically changed, personalization[2] occurs. This condition is usually frustrating for the student since he is receiving the message (content) in a manner that is not comfortable for him. The student is receiving information that is not in the student's accustomed learning behavior. The student is being frustrated purposefully so that he may become accustomed to other means of transmission. In the same way, personalization of content may be obtained by individualizing the last four

[1] That process by which the teacher, through diagnostic, evaluative and methodological procedures, pinpoints the combination of skills and methods of presentation which are uniquely motivating for a particular child in a specific environment and at a specific time.

[2] After individualization has been achieved, the child is exposed to settings, modes, inputs and outputs that force him to use his strengths to decrease his weaknesses. It is a process by which the child becomes less sensitive to frustrations generated in learning situations.

taxonomic components and systematically changing the content. Evidence indicates that the most frustrating situation for the child is the personalization of both the *What* and *How* of instruction.

Whenever the *What* and/or *How* of instruction are held constant or changed, it is a purposeful choice on the part of the teacher. A strategy requires a conscious choice. In this conscious choice of strategy, the teacher may be addressing himself to only one aspect of pupil behavior. For example, the teacher may decide to use a strategy that will modify pupil behavior attitudinally or developmentally. Also the teacher may address himself to various aspects or all aspects of pupil learning style(s) through the total range of pupil learning behavior. These aspects include: attitudinal, developmental, cognitive, affective, emotional, psychological, physiological and pathological.

A strategy is the unique plan incorporating the last four numbers of the Taxonomy (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output), that conveys an activity in a way that is designed to involve the child in the task at hand. For example, M's teacher planned instruction using a Teacher-Total Group Setting, a Test-Response Mode, an Auditory-Visual Input and a Vocal-Motoric Output. After five minutes, M was no longer able to contain himself with this strategy. Then the teacher modified the lesson so that he could spend time on a Teacher-Student basis with M. Later when M was mentally set for instruction, the teacher put him in a Teacher-Small Group Setting. On the other hand, J was able to do a similar lesson for twenty minutes. These modifications were based on a "data bank" of observations, testing, previous records, interviews and information coming from teacher-student relationships. The teacher utilized a conscious decision making process when the exigency with M occurred. The teacher modified a strategy in order to meet a specific need. This example illustrates the philosophy of the Taxonomic Instruction Project. By using the four taxonomic components of the *How* of instruction, the proper combination of variables is utilized that will engage a student in instructional treatment. The name given to that combination of taxonomic components that bring about a desired result is *strategy*. The reader is referred to Chapter III for further expansion on the decision making process.

It is appropriate at this time to take a closer look at the *How* of instruction. The *How* of instruction includes four major components: Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output. Subsumed under each of these categories are various subcomponents. Under Instructional Setting, there are eight distinct groupings: 1) Teacher-Student; 2) Student Self-Instruction; 3) Student-Student (Parallel); 4) Student-Student (Interactive); 5) Teacher-Small Group; 6) Student-Small Group; 7) Teacher-Total Group; and 8) Student-Total Group. Under Instructional Mode, there are nine distinct styles of presentation: 1) Play-Puzzle; 2) Play-Chance; 3) Play-Competition; 4) Test-Response; 5) Role-Playing; 6) Exploration; 7) Programmed Response; 8) Problem Solving; and 9) Exposition. Under Sensory Modality Input, there are seven distinct inputs: 1) Kinesthetic; 2) Auditory; 3) Auditory-Kinesthetic; 4) Visual; 5) Visual-Kinesthetic; 6) Auditory-Visual; and 7) Visual-Auditory-Kinesthetic. Under Sensory Modality Output, there are five distinct outputs: 1) No Response; 2) Motoric Response (gestures and movement); 3) Vocal Response; 4) Motoric Response (marking and writing); and 5) Vocal-Motoric Response. In order to explain each of the items subsumed under these four taxonomic categories, the project's operational definitions will be given in this chapter.

Instructional Settings pertain to the classroom groupings that provide the child with various interactive learning situations. It is the consensus of the project staff that the numerical sequence listed above parallels the child's social development.

The staff views the first setting, Teacher-Student, as an extension of the mother-child relationship. Student Self-Instruction, the second setting, is comparable to the child playing by himself without the intervention of his mother. The third setting, Student-Student (Parallel), is analagous to the side-by-side noninteractive play of two children. Student-Student (Interactive), the fourth setting, is similar to that stage of social development in which two children are able to play together with a considerable degree of interaction. Teacher-Small Group, the fifth setting, is seen as a still higher level of social development because it requires both interaction with peers and an authority figure. In the sixth setting, Student-Small Group, one student is required to assume those social responsibilities necessary for leadership, while an acceptance of peer leadership is demanded of others in the group. The seventh and eighth settings, Teacher-Total Group and Student-Total Group, respectively, are similar to the two preceding settings, the difference being that the field of interaction is enlarged.

Teacher-Student is a one-to-one instructional interaction between teacher and student. Student Self-Instruction is a setting in which the student is personally involved in instructing himself and in which he sets his own pace for learning. Student-Student is the Instructional Setting whereby a one-to-one purposeful relationship exists between two students; the students can be paired with equal or unequal skills depending on the goals of the teacher. A distinction is made between Student-Student (Parallel) and Student-Student (Interactive). The former does not involve any active intercommunication between two students. The students may simply be grouped together but work independently. This setting is viewed as containing greater socialization and self-containment factors than are found in the isolated setting of Student Self-Instruction. Student-Student (Interactive) denotes two students who are interacting on some common task and is used with more frequency than Student-Student (Parallel). The Teacher-Small Group Mode is a setting in which the teacher is instructing more than one student, but never more than fifty per cent of the class population. Student-Small Group is a setting in which a student (acting as leader) is instructing and/or organizing a part of the class larger than one student but not more than fifty per cent of the class population. Teacher-Total Group is an Instructional Setting in which the teacher instructs a total group. Instructing a total group may be done in a way that recognizes student needs. The teacher may direct questions to the students according to their academic capabilities and potential. For example, a teacher may direct a "yes-no" question to a student who may be scholastically inferior to others in the classroom. In the same manner, the teacher may give a *wh-* question, that is, *where, what, when, why* and *who*, to a student who is able to answer such a question. In this way, student needs are satisfied in a Teacher-Total Group Setting. An important criterion is that every student has an equal chance of being called upon to respond. Student-Total Group is a setting in which a student (acting as leader) is instructing and/or organizing the rest of the class.

These Instructional Settings are not the only consideration in selecting a strategy and they are not necessarily the first consideration; they are, however, one of the four vital taxonomic components in the selection of strategies.

Instructional Modes are ways of presenting an instructional activity or content. As mentioned earlier, there are nine Instructional Modes that provide the student with variation; a varied presentation is needed since a population of emotionally disturbed children often has extreme deficiencies which require repetitiousness of presentation. Presentation can become extremely dull with the constant use of the same mode.

As an outgrowth of experimentation with taxonomic modes, the following order appears to be emerging on the basis of social development: 1) Play-Puzzle; 2) Play-Chance; 3) Play-Competition; 4) Test-Response; 5) Role-Playing; 6) Exploration; 7) Programmed

Response; 8) Problem Solving; and 9) Exposition. Some modes require greater inner resources and storage of knowledge on the part of the student. Problem-Solving and Exploration, for example, cannot be used initially with children having great academic deficiencies. A hierarchical order with regard to Exploration and Problem-Solving seems apparent, Exploration being a prerequisite to Problem-Solving.

Within each of these modes, there is a range of ability to which instruction is addressed. Therefore, Exploration at the lowest Sequential Level may be easier than Play-Chance at the highest Sequential Level.

Play-Puzzle, the first Instructional Mode in the hierarchy, presents the student with a problem that can be worked out by means of the student's skills and is particularly adaptable for use in self-instruction. Play-Puzzle is highly structured and precise and has less of a social component than Play-Competition. For example, a teacher may give a series of action pictures or drawings and ask the child to arrange them in the proper chronological sequence or a puzzle may be solved in a play situation. Still another example might be the regular use of crossword puzzles for vocabulary achievement on all levels.

Play-Chance requires a highly structured, precise performance from the student. Play-Chance is the manner of instruction in which the element of chance is emphasized; for example, in instructional games where every player has an equal chance regardless of his skills. Play-Chance requires less social control than Play-Competition which requires working in a social context with other people. There is some skill involved in Play-Chance, but the student cannot manipulate the outcome. In a game of Play-Chance, the factor of manipulation is much less than in Play-Competition. For example, there is no control, even with practice, when one flips a coin. The chances are always fifty per cent that a head or a tail will occur. In Play-Chance, the student is not the agent but rather is controlled by an external agent, in this case, chance. A typical example of an instructional Play-Chance Mode is when the student is requested to call out all the words that he can think of that begin with the letter P. The student is in a Play-Chance Mode because he does not know what letter the teacher will request. The student must think of words beginning with the letter that the teacher (outside agent) chooses.

In Play-Competition, the student has more intrinsic control. He is the agent or at least more of an agent than in Play-Chance. The student is able to, or has the potential to, control or manipulate the situation. A greater manipulation is involved for the good of a team effort. In Play-Competition, there is a greater and more purposeful manipulation that is not inherent in Play-Chance. The student takes into account the welfare of the group as well as his own welfare. The student must ask himself the question: "What is good for the team in addition to what is good for myself?" A greater socialization is required. Also, Play-Competition is highly structured and precise. Any game gives evidence of this fact; baseball, for example, has precise rules and regulations. A precise performance is required on the part of the participants. Added to this, a high degree of social interaction (competition) is evoked.

Using the example mentioned previously in which the teacher asked the students to think of all the words beginning with the letter P, modifications can be made to change this Play-Chance Mode to Play-Competition. These modifications may be simply the inclusion of a stopwatch. Then the teacher may ask the class (which is divided into teams) how many words they can think of beginning with a certain letter in twenty seconds. The student is in a competitive mode. If he is working individually with the teacher, he is in competition with himself. For example, the first time that a student is given twenty seconds to think of words beginning with a certain letter, he may think of ten. The next time he is asked to think of words beginning with the same letter, he is in competition with himself, that is, in competition with his previous score.

The elements of self-containment and social control are necessary in both modes under discussion. An illustration is helpful at this time. The game of *Bingo* was used with some students in a Play-Chance Mode. Everything went well until the teacher decided to change the mode to Play-Competition. Deterioration of this activity immediately became apparent. The students could not see any relationship between the team's efforts and themselves. There is no question that Play-Competition requires a higher level of social development. Self-containment is needed for a Play-Chance activity but self-containment and social control are both needed for a Play-Competition Mode.

Any piece of material or instructional activity may have only one Instructional Mode initially. When a component is added by the teacher or student, another mode is created. You will recall that in the example of Play-Chance, it became Play-Competition by adding a stopwatch. Therefore, any piece of material can be adapted to many different modes by simply adding additional dimensions.

Another example might be helpful. Take the standard game of *Spelling Bee*. This is initially a mode of Play-Chance because no skill is involved in that the teacher is randomly presenting words. However, if the words have been previously learned, skill enters into the situation, and the mode changes to Play-Competition.

Some games may have both elements—Play-Chance and Play-Competition—but whichever has the greater factor of agent determines the mode. Agent is defined as the person who is the predominant manipulator of the Instructional Mode.

To give an example—suppose several children are playing the game *Phonic Rummy*. Some manipulation (skill) is possible, but the students cannot control the outcome of the game. The mode is Play-Chance because the students are the recipients of cards and have no control over what cards are dealt to them or what cards they will draw.

Test-Response is perhaps one of the most widely used modes. Test-Response elements are often embedded in the other instructional modes if some variation of a test response is required. Test-Response is inherently a part of Programmed-Response. The feedback element of Test-Response is not as immediate as in Programmed-Response and has more exposition. A Test-Response Mode requires a specific response to a particular stimulus in order that the teacher can determine whether the child has learned the information that has been transmitted. Since Test-Response is more highly structured than other modes, it is considered better for the child who has less social control. Test-Response is a mode having precise and discrete parameters. After the student has read or listened to a particular selection of material, the teacher may require the child to answer questions that are multiple-choice, true-false, or sequential. This is a Test-Response Mode.

Role-Playing involves two or more persons (students and/or teacher) acting out before an audience a predesigned improvisational situation prepared by the teacher (and/or students). Role-Playing is a presentation employing impromptu dialogue. An audience is needed, even if the audience is the teacher. Role-Playing involves a high degree of precision or specificity. For example, charades including names of books, films, proverbs, etc., fall into this mode.

Exploration is that style of presentation which requires the child to refer to other sources of information or to his own realm of experience. In Exploration, there is no problem situation. As previously stated, exploration is a prerequisite or initial step to Problem Solving. Exploration utilizes the student's experiential background. There is no specificity in Exploration. There are several types of Exploration, e.g., social situation exploration, aesthetic exploration, etc. When a child states that a maple leaf looks very much like a human hand, the child is exploring shape, design and size; he is identifying similarities and associating parameters according to his own personal background.

Programmed Response is the presentation of material in which exposition is extensive, the sequential learning steps are small and immediate feedback as to the appropriateness of a response is given. Programmed Response may utilize programmed texts and/or programmed machines. It may also be prescribed for the student in a number of Instructional Settings.

Problem Solving is the presentation of a problem situation requiring the student to resolve the issue by means of reasoning. Problem Solving does not necessarily have to be aesthetic or creative. This mode is quite structured and formal; a specific problem is presented and needs to be solved. For example, the teacher may present his students with several clues in a mystery story and ask them to solve the mystery. The students must be able to reason out the problem logically by using the clues given.

Exposition is an extended discourse on a subject through a lecturing approach as well as a sequential orderly presentation of ideas and information by the teacher and vice versa. It does not necessarily require a response but may ultimately need one. In this sense, no feedback is required from the students but they may eventually respond in this mode. Exposition does not always need to be teacher-initiated. A student may instruct others very effectively by using an Exposition Mode. Exposition may be planned or unplanned. For example, tangential thoughts and/or momentary or lengthy digressions are Exposition. This mode has the goal of filling in an informational background. In a broader sense, Exposition includes debate and dialogue. When a subject is expounded upon, there can be a shifting of positions between teacher and class or teacher and student. This may lead to a dialogue or debate.

It is necessary to emphasize that one Instructional Mode may possess the features of other modes, but it is labeled on the basis of predominating elements.

In the project's previous manual, the staff used the term Communication Input to mean the student's sensory channel selected by the teacher for reception of information. However, upon further consideration, this label was changed to Sensory Modality Input. The expression Sensory Modality is more relevant and less ambiguous than the word Communication. Sensory Modality Input is restricted to the three senses of sight, hearing and feeling. The senses of smell and taste are not utilized because the staff has not found them relevant to instructional situations. Therefore, Sensory Modality Inputs are not inputs from the total range available to any student but only those of sight, hearing, feeling and combinations of these three. Sensory Modality Inputs are selected by the teacher for the student's reception of information. The teacher is to choose that input or inputs appropriate to the preferred sensory channel of the student.

As an outgrowth of experimentation, the project's staff has evolved the following hierarchical order of inputs: 1) Kinesthetic; 2) Auditory; 3) Auditory-Kinesthetic; 4) Visual; 5) Visual-Kinesthetic; 6) Auditory-Visual; and 7) Visual-Auditory-Kinesthetic.

Kinesthetic, the first Sensory Modality Input, transmits information through the sense of feeling. In the Taxonomy, this modality includes the following components: the full body sense of motion and position; the sense of touch or contact with the finger tips (the tactile sense); and the sense of feeling through the use of the whole hand (the haptic sense). Therefore, Kinesthetic is defined with reference to specific points of contact.

The Sensory Modality Input of Kinesthetic is not as widely utilized in normal schools as it is in special schools. In special schools, the Kinesthetic Input is as vital as the other two inputs of vision and hearing.

To illustrate the utilization of this input, suppose the teacher has a student walk the length of the classroom several times and then asks the student to close his eyes and walk what he estimates to be halfway across the classroom and then stop. The student will rely

primarily on the full body sense of motion and position. The student's body perceptions will give him his judgmental answer. There is no auditory or visual information fed to the student involved in this task. Directions for the task are not considered an Auditory Input. The teacher will not clap his hands and stop clapping when the student reaches the middle of the room. The teacher will not cue the child orally and tell the student to stop at the desired destination. The child relies on kinesthetic feedback, i.e., information which comes from his body sense.

The tactile sense is the sense of two-dimensional contact on some surface via the finger tips. For example, the teacher asks a blindfolded student to trace with his index finger certain letters cut from sandpaper and then asks him to trace these same letters on sheets of sandpaper or on the blackboard. Kinesthetically, the point of contact is through the fingertips. The child who is required to identify textures, i.e., sandpaper, silk, slate, concrete, etc., utilizes the tactile sense of feeling.

For the haptic sense, the point of contact is the full hand which provides a three dimensional object. For example, the teacher asks a blindfolded student to identify certain items that are placed in a paper bag. These items may include a walnut, an eraser, a paper clip, etc. The student is using the haptic sense of feeling.

The taxonomic term kinesthetic (adjective) or kinesthesis (noun) refers to the totality of feeling as a Sensory Modality Input. It is a term that covers the three elements of the sense of feeling.

Auditory pertains to the transmission of information to the student through the stimulation of the sensory system of hearing. The Auditory Input may be extrinsic; that is, the signal may come from some outside agent such as a tape recorder, the teacher or another student. Also, it may be intrinsic; that is, the child who is repeating aloud information previously registered by him supplies himself with his own Auditory Input. He is a self-monitoring Auditory Input.

Auditory-Kinesthetic is the transmission of information using the sensory systems of Audition and Kinesthesis, whether simultaneously or in close sequence. For example, the teacher traces a letter or word on the child's back and says the letter or spells the word at the same time. The entire upper back of the child is used. The letters or words are exaggerated in size. The child is asked to repeat the letter or spelling of the word and the word itself.

Visual pertains to the sensory input of sight, the stimulation of the sensory system of the eyes through which information is transmitted to the student. For example, reading a book or viewing a filmstrip are two modes using a Visual Input.

Visual-Kinesthetic is the transmission of information using the sensory systems of Vision and Kinesthesis. This input may also be simultaneous or in close sequence. For example, if the child is tracing cut-out letters on sandpaper, he is seeing and feeling the outline of the letter.

Auditory-Visual is the Sensory Modality Input that transmits information to the student through the combined channels of hearing and sight. For example, a student using a Language Master may simultaneously hear and see the stimulus. However, an auditory-visual activity does not necessarily need to be simultaneous; it may be in close sequence and may fluctuate between the two sensory inputs of Vision and Audition. For example, the teacher may want the child to hear a story that he reads or that is on tape before the student begins to read it himself. If the task is sequential, the time sequence must be compressed. Therefore, this mode cannot be used if the teacher reads the story on Monday and requires the child to read the story on Tuesday. The spacing of the two activities necessitates the use of two distinct and separate inputs. On Monday, the input is only Auditory; on Tuesday, the input is only Visual.

Visual-Auditory-Kinesthetic is a Sensory Modality Input that transmits information to the student through the combined channels of Vision, Audition, and Kinesthesis. For example, the teacher requests the child to type a letter of the alphabet and say it as he types and then to read the name of the letter after it is typed. There is an integration of three inputs utilized in this instructional activity.

With regard to Sensory Modality Inputs, evidence gathered to this point seems to indicate that whereas normal children are basically visile *and* audile, emotionally disturbed children tend to be either one *or* the other, that is, visile *or* audile.

Sensory Modality Output is the channel of expression selected by the teacher and utilized by the student to communicate a response. Sensory Modality Outputs are the systems of expression that are available to the student which include: 1) No Response; 2) Motoric Response (gestures and movement); 3) Vocal Response; 4) Motoric Response (marking and writing); and 5) Vocal-Motoric Response. The first is a covert response and the last four types of responses are overt. It is the feeling of the project staff that the hierarchical order, based on physiological development for Sensory Modality Output, is as above.

Motoric Response is divided into two steps, two and four in the developmental arrangement, since the definition of motoric includes gestures and movement in addition to writing and marking. Gestures precede a vocal response but writing succeeds a vocal response.

No Response is considered a covert response because it is a concealed response. There is a response but it is just not observable. No Response is a situation in which the reception of information does not evoke an observed learning behavior or observed response. The instructional task is not such that an overt response is necessary. When the teacher desires an output of No Response, as with any other output, it is a conscious choice on the part of the teacher.

Inputs are related to transmission on the part of the teacher and reception on the part of the child. Outputs are the expressive channels available to the child. There is no set order in which the four components of the *How* of instruction are selected. A teacher may desire to select the Sensory Modality Output as the first component in strategy making and then select the remaining three taxonomic components, i.e., Instructional Setting, Instructional Mode and Sensory Modality Input. The sequential order in the planning is not important but rather it is important that one element under each category be utilized, based upon diagnostic information about the child.

Vocal Response is the purposefully planned instructional activity whereby the student is required to respond either by speech or by some form of vocalization, e.g., grunts, gross sounds, etc. Any answer that is given vocally to a stimulus is a Vocal Response.

Motoric Response is any type of overt response to a stimulus that is not vocal. It includes expression through writing, typing, gestures or any other body movement that conveys or signals information. In the developmental progression of skills, Motoric Responses are viewed as being of two levels of complexity; therefore, they are acquired at two different periods of time, the Motoric Responses of less complexity preceding those of more complexity. Option 2 (gestures and movement) and option 4 (marking and writing) reflect the time lag in the acquisition of the two levels of motoric skills.

Vocal-Motoric Response is a response to a stimulus incorporating the vocal and motoric elements discussed above.

The four taxonomic categories discussed here, i.e., Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output, all provide the teacher with feedback so that modifications of strategy can be made. For example, if a strategy chosen

by the teacher fails, one or more taxonomic components should be changed so that success in the instructional task is achieved by the student. The decision made in the modification of strategies is based on several factors: diagnostic information, case studies, guidance files, observations and teacher conferences.

The following are some brief examples illustrating how strategies are decided upon. In most instances, the teacher holds three of the four components constant while varying the fourth until the desired result is achieved.

## R

R was very comfortable working in an Instructional Setting other than Student Self-Instruction. He was gregarious in nature and preferred to work with other people rather than by himself. R wanted to work with other people, even with peers he did not get along with, rather than alone.

The reader will recall that the hierarchical order of Instructional Setting is as follows: Teacher-Student, Student Self-Instruction, Student-Student (Parallel), Student-Student (Interactive), Teacher-Small Group, Student-Small Group, Teacher-Total Group and Student-Total Group. In R's situation, this ordering had to be modified to the student's needs. R had to learn to adjust in his academic environment by working individually.

Therefore, he was gradually weaned from all Instructional Settings of comfort (those settings of working with others) to an Instructional Setting of partial discomfort, that is, Student Self-Instruction. Strategies were selected to personalize R to work by himself. This process of personalization was carefully sequenced from the largest grouping, Teacher-Total Group, to Teacher-Small Group, to Teacher-Student and finally to Student Self-Instruction.

## A

Instructional Mode was the variable that was manipulated for A. The other three components of the *How* of instruction, that is, Instructional Setting, Sensory Modality Input and Sensory Modality Output, were held constant.

A had a definite preference for working in a Programmed Response Mode and there was difficulty getting him to work in the other modes. A delighted in the extensiveness and sequential learning steps that are basic to Programmed Response and he was comfortable in receiving immediate reinforcement as to the appropriateness of a response. When the other Instructional Modes did not offer this extensiveness and feedback, A's productive output ceased.

Strategies had to be developed in order to wean A from a Programmed Response Mode. Strategies were developed to build strengths in the other Instructional Modes. Initially, immediate reinforcement was given by the teacher in the other Instructional Modes—Play-Puzzle, Play-Chance, Play-Competition, Test-Response, Role Playing, Exploration, Problem Solving and Exposition. Work in those other modes was sequenced in smaller steps. Eventually A began to succeed in the other modes and, as time went by, experienced less and less discomfort.

## J

J, unlike A, had a definite preference regarding Sensory Modality Input; J could not work in any input except Kinesthetic. Since Kinesthetic is the first step in the hierarchy of Sensory Modality Input, J was moved to the second option, Auditory, and finally to

Auditory-Kinesthetic. Any effort to personalize J visually, the next step in the hierarchy, caused a marked decline in J's engagement index. Up until the time school recessed for summer, J was only able to accommodate himself to three options of Sensory Modality Input. This gain, however small, indicated that J was able to handle discomfort and was able to advance to the other Sensory Modality Inputs.

When J returns to school in September, the teacher will continue giving him different Sensory Modality Inputs so that he will be able to function with all inputs. Strategies will need to be devised to accommodate J to the anticipated discomfort of the remaining inputs.

## V

Circling the appropriate answer on an answer sheet seemed to present no problem for V. He enjoyed circling the right answer from amongst several possible answers. The problem arose when he was required to write (not circle) the appropriate answer. When V could not see the possible answers, he refused to write. He would respond vocally with the appropriate answer but did not want to write the answer. The teacher hypothesized that perhaps V did not want to attempt to write an answer that he could not spell. Therefore, the teacher decided to use the strategy of having V write the appropriate answer from a list of four choices that could be seen. In this way, V began to write out answers instead of circling them. The strategy was successful. Eventually, after he developed confidence in his spelling ability, he began to say and write the appropriate answers. Today V is comfortable using all the Sensory Modality Outputs offered in the Taxonomy.

* * * * * *

The brief examples given so far have not been representative of every taxonomic category. It is beyond the scope of this manual to give an example for each and every combination of the Taxonomy, that is, Basic Skill, Basic Subskill, Sequential Level, Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output. Such a myriad task would be most boring for the reader. In fact, it is really unnecessary. If this were done, there would be mathematically roughly 288,000 possible combinations. Although there would be many combinations that are logically impossible, there are many combinations that are both logically and academically sound. An example of an impossible combination is as follows:

| Basic Skill | Basic Subskill | Sequential Level | Instructional Setting | Instructional Mode | Sensory Modality Input | Sensory Modality Output |
|---|---|---|---|---|---|---|
| 4 | 2 | 2 | 7 | 6 | 1 | 1 |

This taxonomic combination describes a Study Skill activity using the Dictionary for Grades 2-4. The setting is Teacher-Total Group utilizing an Exploration Mode, having a Kinesthetic Input and No Response Output. This combination of taxonomic components is

instructionally unsound because the Sensory Modality Input of Kinesthesis usually requires a response. Other components of this taxonomic combination are also infeasible but the point has been made. It is sufficient to say that the majority of the taxonomic combinations are slots that have the potential to be filled. For example:

| Basic Skill | Basic Subskill | Sequential Level | Instructional Setting | Instructional Mode | Sensory Modality Input | Sensory Modality Output |
|---|---|---|---|---|---|---|
| 2 | 1 | 2 | 7 | 4 | 6 | 3 |

This combination describes an instructional activity having the content of learning consonants, Sequential Level being Grades 2-4. The setting is Teacher-Total Group employing a Test-Response and having an Auditory-Visual Input which requests a Vocal Response. It is readily seen that this combination is both possible and logical. There are, in addition, a number of taxonomic combinations that are possible but not as readily seen. For example:

| Basic Skill | Basic Subskill | Sequential Level | Instructional Setting | Instructional Mode | Sensory Modality Input | Sensory Modality Output |
|---|---|---|---|---|---|---|
| 3 | 1 | 3 | 1 | 4 | 4 | 4 |

This taxonomic combination describes an activity in the Comprehension area and requires the student to find the Main Ideas. The level is Grades 4-6 and the Instructional Setting is Teacher-Student. The Instructional Mode is Test-Response presented by a Visual Input and requiring Motoric Response (marking and writing). This taxonomic combination is confusing because the Instructional Setting indicates a Teacher-Student grouping while the Sensory Modality Input indicates only a Visual Input. One may question why the teacher is working on a one-to-one basis if there is no Auditory Input. Although the strategy seems to have no logic, nevertheless, it is a valid strategy for a specific set of conditions. In any event, the strategy is not an impossible one. The specific set of conditions, for example, may be a teacher who knows that the child functions well and is most comfortable with an Auditory Input within any Instructional Setting but is uncomfortable with a Visual Input. Therefore, the teacher has chosen to select the low level Teacher-Student Mode to dissipate the discomfort of the Visual Input.

The purpose of this manual, specifically of this chapter, is to give examples of activities using the seven taxonomic components of the *What* and *How* of instruction. In order to clarify this concept, the project staff wishes to use one taxonomic component, Instructional Mode, and present examples of instructional activities in the framework of the five Basic Skills: Cognitive-Perceptual, Language Analysis, Comprehension, Study Skills and Aesthetic Expression. Even this undertaking necessitates 45 specific examples. Furthermore, these 45 examples will be described only in the framework of the Sensory Modality Input of Auditory-Visual. Needless to say, the same examples may use other sensory inputs. The number of possible examples would then run into the hundreds. When another taxonomic component, e.g., Instructional Setting, is utilized, the number of examples would then run into the thousands.

| BASIC SKILLS | INSTRUCTIONAL MODES | | |
|---|---|---|---|
| | PLAY-CHANCE | PLAY-COMPETITION | PLAY-PUZZLE |
| COGNITIVE-PERCEPTUAL | A game using the rules of Bingo. Figures such as a square, circle, triangle, etc. are used. The teacher reads and shows (flashes) the symbol. The students are required to locate the symbol on their cards. | The same as *Play-Chance* but including a stopwatch and a team effort. | Comic strip sequences are separated and mixed up. The comic strips do not have words. The students are required to put the pictures into an appropriate sequence. |
| LANGUAGE ANALYSIS | A game using the rules of the card game Rummy. Instead of symbols as in *Cognitive-Perceptual*, letters, prefixes, roots, suffixes, and words are used. | The same as *Play-Chance* but including a stopwatch and a team effort. | The letters of a word are separated and mixed. The teacher requires the students to unscramble the letters and put them in the correct sequence for the word that is flashed and read by the teacher. |
| COMPREHENSION | A game using the rules of Bingo. The teacher reads a definition of a word and the students are required to locate the word on their cards. | The same as *Play-Chance* but including a stopwatch and a team effort. | Any crossword puzzle on any level for the building of word meaning skills. |
| STUDY SKILLS | The teacher flashes and reads a word to the class. The students are required to find the word in the dictionary and read the definition. | The same as *Play-Chance* but including a stopwatch and a team effort. | The putting together of a map which is in the form of a jigsaw puzzle. |
| AESTHETIC EXPRESSION | Mood music is played. The students are required to interpret the mood by movement (dance), description (talking), painting, etc. | The game of charades in which the students act out a word, book title, etc. for the others to guess. | The presentation of a musical motif embedded in other musical melodies. The students are required to tell if they hear the embedded theme in the other melodies. |

| BASIC SKILLS | INSTRUCTIONAL MODES | | |
|---|---|---|---|
| | TEST-RESPONSE | EXPLORATION | PROGRAMMED RESPONSE |
| COGNITIVE-PERCEPTUAL | The child is given a number of colored blocks and is required to construct a design that is presented to him. | The child is presented with a picture having minimal clues and is asked what the picture is. | The child is required to execute a series of maneuvers, e.g., to step three paces forward, to step one pace to the left, etc. |
| LANGUAGE ANALYSIS | Taped recording giving instruction for the "gl" blend with accompanying worksheet. The child is required to circle the correct answer on his paper. | The child is presented with minimal visual clues to words that are only partially given. He is asked to complete the letters or words. | The child is instructed in the use of certain prefixes, suffixes, and roots. He is then required to put these language elements together to make desired words asked for in the programmed text. |
| COMPREHENSION | A taped story requiring the student to choose the main ideas or details from multiple-choice questions on a dittoed worksheet. | The student reads a story silently while the teacher reads it aloud. The student is then required to complete the unfinished story or to change the ending. | Tape recording of a reading passage with accompanying worksheet. The student is asked questions on main ideas, details, etc. and responds. The answers are given immediately by the tape. |
| STUDY SKILLS | The teacher requires his students to answer questions about a bar graph which was presented and explained to the class. | Information that was given in a line graph is asked to be transposed into any other type of schematic presentation. | The presentation of map reading requiring the student to fill in words pertaining to information given in the preceding frame. The units of information are small and discrete. |
| AESTHETIC EXPRESSION | The student is requested to silently read a poem as the teacher reads it aloud. Afterwards, the teacher asks the student to tell how the poem made him feel. | The presentation of one art form (music) and transposing the feelings generated into another art form, e.g., drawing, dancing, photographs, etc. | Not applicable—impossible as there exists a contradiction. |

| BASIC SKILLS | INSTRUCTIONAL MODES | | |
|---|---|---|---|
| | PROBLEM SOLVING | EXPOSITION | ROLE-PLAYING |
| COGNITIVE-PERCEPTUAL | Given four lines of equal length, the student is asked to make figures such as a square, a triangle, a rectangle, etc. or given half circles and straight lines, the student is asked to make letters. | The teacher explains the correct organization of the number of straight lines that are needed to make the following figures: a square, a triangle, a rectangle, and polygons of all kinds. | The students are given names of figures, e.g., a circle, a triangle, a rectangle, etc. and are asked to describe themselves by acting out their shapes. The students may be asked to combine shapes to form new figures such as a circle in a square, etc. |
| LANGUAGE ANALYSIS | The student is asked to break down a code, anagram, cryptogram or acrostic and find the hidden message. | The teacher explains the correct organization of the number of half circles and straight lines that are needed to make certain letters, e.g., "b, d, p, c," etc. | The students are all given the name of a letter of the alphabet and are told to act out their letter by talking about how the letter is printed or written and are then asked to form words with the other letters. |
| COMPREHENSION | Given several clues in a mystery story, students give their logical conclusions to solve the mystery. | The teacher talks on a topic, for instance, the structure of the short story for the purpose of imparting specific information to the class. | The teacher asks several or all the students to complete an improvisational situation previously given by acting out how they feel the situation should end or by changing an existing ending. |
| STUDY SKILLS | Given statistical facts in raw form, students draw a graph (bar, line, circle, etc.) that includes all the facts presented. | Lecture approach on specific library skills, e.g., how the library is organized using the Dewey Decimal System. | The students are each given a name of a planet in the solar system and are asked to show its movement around the sun. The audience is required to relate the planet's movements, its distances from the sun, etc. |
| AESTHETIC EXPRESSION | The students are given details on a specific situation, e.g., the number of characters, a general plot outline, etc., and are asked to incorporate these elements into a dramatic form which the students feel best accommodates these elements. | After a dramatic reading of a poem or play, the teacher gives a critique on the content. | The acting out of a play that was written by a student or students or the acting out of a situation created by a student or students. |

The aforementioned instructional activities are examples of possible strategies for specific children and for specific instructional situations. The Sensory Modality Input has been, for the most part, Auditory-Visual. All of these examples can utilize other inputs, e.g., Visual. When the teacher consciously selects the Visual Input, it is for a conscious reason. Perhaps the child's strengths are in the visual reception of information. The teacher will then use the child's strengths and build from that starting point. It would be foolish to begin individualization of instruction with an Auditory Input for a visile child. After individualization has been achieved, personalization can be introduced to the child with the use of an Auditory Input.

In the same manner, children who are kinesthetic may find great difficulty using other Sensory Modality Inputs and should be slowly introduced to Inputs other than kinesthetic only when comfort and success have been experienced by the child using a Kinesthetic Input.

What the project is saying is that there is a specific time and place for all inputs, as well as the other taxonomic components, in the instructional treatments. Each instructional situation differs as enormously as each child in the classroom.

## *SUMMARY*

Using the "data bank" of diagnostic tests, cumulative files, teacher-student conferences and observations, the teacher raises a series of questions about the child and makes a conscious decision regarding the *How* of instruction for a specific child. The taxonomic options chosen by this conscious decision making process constitute a *strategy*. At first, the decisions are tentative and the treatment needs to be field tested with the student. When a positive residual increment is found, further questions are raised and further conscious decisions are made. The process is repeated and refined. Practice of the treatment may or may not show a positive residual increment. If the practice does not show success (scholastic attainment or behavioral improvement), new decisions are made based on all available information from the data bank. If there is success and the practice shows success several times, the treatment has achieved the status of a strategy for a specific instructional situation.

This chapter has tried to show a strategy in terms of the *How* of instruction. A strategy consists of the conscious decisions for utilizing the last four taxonomic components—Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output. These four taxonomic components convey a material or instructional activity to partially or totally involve the child in the task at hand.

This chapter has attempted to show the large number of possible combinations of the taxonomic components and has tried to present a representative number of examples. In addition, the project has indicated hierarchical orders for each taxonomic component of the *How* of instruction. Although it was not the objective of this chapter to indicate a hierarchical ordering of the *What* of instruction, the reader is requested to refer to the project's first manual, *THE TAXONOMIC INSTRUCTION PROJECT: A Manual of Principles and Practices Pertaining to the Content of Instruction*, published by the Research and Demonstration Center for the Education of Handicapped Children, Teachers College, Columbia University, in December, 1969.

The project has tried to show the decision making process in terms of individualization and personalization of instruction. The reader will recall that after the preferential combination of taxonomic components (based upon the data bank) is found to motivate a particular child in a specific environment and specific time, individualization is attained.

Only after the child is comfortable and is experiencing success will the teacher then plan slight frustration by exposing the student to settings, modes, inputs and outputs that force the child to use his strengths in order to decrease his weaknesses. This process is called the personalization of instruction.

It is appropriate to recall the project's philosophy of working with the strengths of the child instead of his weaknesses. The project begins with the child's strengths and builds in the framework of the Taxonomy. This will be further explained in the next chapter.

The Taxonomic Instruction Project is dynamic in that information from each child's data bank leads to the formulation of hypotheses regarding strategies that are continuously being tested and evaluated. This, in turn, leads to the formulation of new hypotheses, new testing and new evaluations. This cycle is never ending in the search for new information as to what constitutes the optimal strategy for each child. Hopefully, through this conscious process of experimentation and decision making, a program of individualization and personalization can be effected for each child.

## CHAPTER III

## THE SELECTION OF STRATEGIES: A DECISION MAKING PROCESS

The main objective of this chapter is to describe and explicate the decision making process by which taxonomic instructional treatments are developed for emotionally disturbed pupils. Discussed are data sources essential to decision making, ways of interpreting pupil test responses, investigatory structures that evolved from the data sources, the analyses of pupil learning behaviors and evaluation systems used to assess the effectiveness of decisions intended for the modification of pupil learning behavior(s). Assessment of decisions leads to the accumulation of additional data from which additional queries about pupil learning behavior are evoked. These, in turn, provide the bases for further decisions which then require evaluation.

Thus, decision making is an evolving process that produces continuity of data collection and successions of inquiries and refinement of instructional treatments. The ultimate objective of this decision making process is to effect optimal pupil engagement with a broad scope of reading content in a wide variety of learning situations utilizing the different channels of Sensory Input and Output as delineated in the Taxonomy.

The mandate to focus on the objective of attaining optimal pupil involvement proceeds from hypotheses central to taxonomic theory. The first of these states that there is a preferential wavelength by which information can be most efficaciously transmitted to and received by the pupil. This wavelength, determined by the project's diagnostic process, is selected from among the variables listed under the Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output divisions of the Taxonomy. When placed in association with appropriate content presented at a non-frustration level, the selection of this preferential wavelength will effect optimal pupil engagement in the learning situation. Briefly, this is not only a statement of the project's first hypothesis but also presents the staff's concept of individualization in the selection of instructional treatments, the initial phase of taxonomic diagnosis.

The second hypothesis is concerned with the relationship of pupil involvement (engagement) to academic achievement; taxonomic theory hypothesizes a positive correlation between them. This hypothesis provides the rationale for the staff's concept of personalization in the selection of instructional treatments which is the basis of the second and third phases of taxonomic diagnosis. The pupil usually comes to the special school with both a constrictive facility in receiving and transmitting information as well as a restricted reservoir of reading content and reading skills. Within these two areas lie the pupil's strengths. The parameters of these areas are established through testing, decision making and observations; beyond these parameters lie the pupil's deficiencies. For the target population, the area of deficiency is usually much larger than the area of strength.

Personalization of instructional treatment seeks to expand that which was formerly restricted (his strengths) and to restrict that which was once expansive for the pupil (his weaknesses). This process necessitates selecting four components from among the entries listed under Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output that will constitute a less preferential wavelength for the pupil. In associating first with known content, and then unknown content, the less preferential wavelength is expected to effect pupil disengagement, the degree and manifestations of which are observed and recorded as data for the ongoing decision making process. Careful regulation of the wavelength and the schedule of pupil exposure, both in disengagement and

in engagement, will result in the development of the pupil's ability to cope with both types of learning situations.

Both principals of the instructional act, the teacher and pupil, bring to the situation habituated styles of transmitting and receiving information. Individualization and personalization focus on the pupil's style. The former (individualization) designates the components of the pupil's habituated performance, which is usually narrow in scope, while the latter (personalization) has the central objective of enlarging the pupil's style to include as many different learning components as is possible for the pupil.

The Taxonomy of Instructional Treatments is the paradigm by which individualization and personalization is achieved. In an operational sense, this use of the Taxonomy applies to the teacher as well as the student. Through the use of the Taxonomy (as a decision making tool in individualizing and personalizing instruction), the teacher is made conscious of his own style of communicating to and with pupils. It is expected that in the act of rendering conscious that which is often at the intuitive and subconscious levels of instruction, the teacher will gain flexibility of style. Furthermore, the teacher is expected to perceive the Taxonomy as an inventory of the vast array of behavioral options that are available to him for the learning needs of the pupils.

The third hypothesis designates the teacher as the referent and postulates an increase in teacher effectiveness directly proportional to the number of taxonomic strategies utilized. Naturally, increased utilization of taxonomic strategies, based on a random selection of the taxonomic components, would do little to heighten teacher effectiveness. Strategy selection is to be predicated on the systems of decision making and evaluation that are delineated in this volume.

As stated previously, the selection of taxonomic components provides for remediation on two levels: individualization and/or personalization of instruction. In the course of developing taxonomic treatments for the pupil, individualization precedes personalization of instruction, but ultimately both types of treatment are administered concurrently.

Individualization requires the selection of an instructional treatment incorporating the seven taxonomic decisions of Basic Skill, Basic Subskill, Sequential Level, Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output which will effect optimal pupil engagement in the learning task. Individualization of instruction in the taxonomic sense of the term, then, is a selection of taxonomic components which are considered preferential for the pupil; as a combined force, they are most productive of pupil engagement. These components are also therapeutic; they are selected from an inventory of the pupil's existing learning strengths and, therefore, generate the least amount of tension and provide a series of successful learning experiences for the pupil.

Personalization of instruction necessitates the same decision making process as does individualization, but it is intended for a different short-range objective. In personalizing instruction, there is deliberate selection of less preferential (less productive of pupil engagement) taxonomic components for the immediate purpose of exposing the pupil to his vulnerabilities for brief periods of time, thereby evoking tensions which are manifested by inappropriate learning behaviors. Exposure to personalization is immediately followed by the pupil's ego-satisfying program of individualization. It is anticipated that alternation of taxonomic treatments between individualization and personalization of instruction will ultimately desensitize the child to the effects of his vulnerabilities.

The structure of the Taxonomy of Instructional Treatments lends itself to a dichotomization of classification. The first part consists of the first three taxonomic components (Basic Skill, Subskill and Sequential Level) and is concerned with the content of the instructional message, i.e., the *What* of instruction. The second part consists of the

last four taxonomic components (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output) and emphasizes the transmission of the instructional message, i.e., the *How* of instruction. Complete individualization and personalization of instruction require a decision making process in which both the content of the instructional message and the means of transmitting the content are considered.

In Volume I of this report, released in December 1969, the major thrust is on the individualization and personalization of content wherein decisions are made on the basis of objective evidence (test measurement and the staff's analyses of the pupil's test-taking techniques). These two sources of data supply sufficient information for individualized and personalized prescriptions of content that are written in the number code system of the first three components of the Taxonomy, i.e., Basic Skills, Subskills and Sequential Levels.

In this second volume, effort is directed toward the explication of the decision making process for the individualization and personalization of the content's transmission. This process is much more complex than individualization and personalization of content. The foci of attention is on manifestations of learning behavior other than academic achievement; therefore, it requires the collection of data from more varied sources than test measurements. Prescriptions for transmission of content, either individualized or personalized, incorporate the last four components of the Taxonomy, i.e., Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output.

In order to present a fully descriptive picture of the project's dichotomized decision making process, it is necessary to recapitulate the project's diagnostic procedures.

## *DIAGNOSIS FOR THE PURPOSE OF INDIVIDUALIZING CONTENT (THE WHAT OF INSTRUCTION)—THE FIRST STAGE OF DIAGNOSIS*

The project's test battery consists of four items: The Gates-MacGinitie Reading Test—Vocabulary and Comprehension, The Wepman Test of Auditory Discrimination, The Taxonomic Instruction Project's Diagnostic Test and The Dolch Two-Hundred and Twenty Most Frequently Used Words Test. Each test provides both objective and nonobjective (standardized and nonstandardized) evidence of the pupil's functional capacity which includes many different types of learning behaviors.

For the project's target population, it is necessary to qualify the objective quantifications obtained on the test battery. This qualifying procedure is achieved by subjecting the child's test responses to a comprehensive search for existing learning strengths. The main concern is what the pupil knows already in the body of content that he is expected to know. Responses are analyzed for evidence of learning strengths. No matter how depressed the test scores are, such evidence is usually to be found; admittedly, the strengths may represent readiness to learn rather than academic skills. The following sequence of questions applied to the evidence develops an inventory in which patterns of skill become apparent:

—If there is evidence of strength, then in what areas of learning does the strength prevail?

—If there are skills in specifiable areas of learning, then to what degree have these skills been acquired?

—To what extent are they transferable to other contexts?

—If the degree and extent of acquired skills are depressed, then how can maximum use be made of the available strength to generate a large body of successful learning experiences?

Specifications for the individualization of content are always drawn from the inventory

of pupil-learning strengths and are expressible in the number code system of the Taxonomy's first three components (Basic Skill, Subskill and Sequential Level).

### *DIAGNOSIS FOR THE PURPOSE OF PERSONALIZING CONTENT (THE WHAT OF INSTRUCTION)–THE SECOND STAGE OF DIAGNOSIS*

The second stage of diagnosis consists of a search for what the pupil nearly knows in the body of content that he is expected to know. By analyzing the pupil's test responses along a success continuum of **key response–near key response–distant response–most distant response**, a number of hunches pertaining to possible learning patterns are evocable; if there is evidence of a near key response pattern, then what is the skill the pupil is using to draw near to the key response? For example, does such a near key response pattern indicate the pupil's knowledge of consonant sounds in the initial position only? If *yes*, then personalization of content can be initiated with these known consonant sounds placed in the final position. In this pattern of near key responses, are there instances of distant responses? If *yes*, then do these responses indicate a breakdown in the pupil's phonic skills? Or are the responses evidence of language deficiency? If *yes* to the latter, then what conclusions, if any, can be drawn as to the extent of the language deficiency? For example, the pupil's key responses usually are found when the task is the labeling of concrete objects. The distant responses are evident when the task is the labeling of actions. Therefore, personalization may be addressed to the development of a meaningful vocabulary related to actions for which the concept is known but the label is unknown.

Thus, while individualization, with reference to the first three taxonomic components (the *What* of instruction), focuses on what is known which, for the target population, is usually a restricted body of content and skills, personalization of instructional content is drawn from the inventory of pupil near strengths and moves from the known to the almost known. All too often personalization is initiated before individualization is sufficiently established for the pupil to experience the quantity of successful learning experiences that will mediate for a positive self-image. The rapid movement from individualization to personalization probably reflects the teacher's need to teach the grade curriculum requirements regardless of the pupil's functional capacity.

A more precise description and explication of the third and fourth stages of diagnosis is reserved for a later section of this chapter. At this point, the inclusion of these stages is to provide the scope of the project's diagnostic process.

### *DIAGNOSIS FOR THE PURPOSE OF INDIVIDUALIZING STRATEGY (THE HOW OF INSTRUCTION)–THE THIRD STAGE OF DIAGNOSIS*

At the third stage of diagnosis, there is a search for the pupil's favored learning style which refers to the last four components of the Taxonomy (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output). The favored learning style is not necessarily composed of components that are most productive for pupil learning. Nor is it necessarily the style that yields the most comfort for the pupil in the learning situation. The style is favored in the sense that the pupil has become accustomed to the components of the style and, in so doing, has accommodated his needs to the limitations of the style.

An instructional treatment can evoke pupil tension from either the treatment's content, the means of transmitting the content, or both. By restricting the content to the inventory of pupil-learning strengths as established at the first stage of diagnosis, the

probability of content effecting pupil tension is reduced. Consequently, if content is consistent with pupil-learning strengths, any evidence of pupil tension would indicate taxonomic components of the *How* of instruction that are unfavored by the pupil. Then, systematic manipulation of these taxonomic components should yield more precise specification of favored and unfavored pupil-learning styles. Upon completion, this procedure provides an inventory of pupil-learning style strengths from which individualization of strategy is drawn.

These strengths are usually as restricted characteristically as the strengths of the acquired content and skills. Nonetheless, instructional treatment, in which individualized content is coupled with individualized strategy, should result in a heightening of pupil self-image. When this is achieved, the fourth and final stage of diagnosis is initiated.

## *DIAGNOSIS FOR THE PURPOSE OF PERSONALIZING STRATEGY (THE HOW OF INSTRUCTION)–THE FOURTH STAGE OF DIAGNOSIS*

In most cases, the pupil's learning style strengths also are reflected by the narrowness of their scope and the weaknesses of the style. Since the staff believes that the components of each taxonomic category in the *How* of instruction are developmentally ordered, it is possible to move the pupil gradually from the favored component in the developmental order to a component that is nearest to the favored one without placing too much stress on the pupil's behavioral equilibrium. Taking one taxonomic category (Instructional Setting) for the purpose of illustration, the pupil may favor the Teacher-Student Setting, option 1 in the developmental order of Instructional Settings. The staff likens this Setting to the mother-child relationship in early childhood. As the child learns to play by himself in the presence of the mother, so too can the pupil be weaned from the teacher to work by himself in the classroom. This gradual habituation of the pupil to less and less favored learning styles in the developmental order is the project's personalization of strategy process.

As the pupil becomes accustomed to an increasing number of learning style components, there is a concomitant expansion of the reservoir of favored learning style elements, the source for individualized strategies and, subsequently, a contraction in the reservoir of unfavored elements which is the source for personalized strategies. The same directional shift is found in the processes of individualization and personalization of content. In this case, known is expanded while the unknown is contracted.

Full application of the four diagnostic stages in the selection of taxonomic instructional treatments for the pupil yields four basic treatments which, in turn, can be refined diagnostically even further to produce modification in the structure of the basic treatments. The first basic treatment consists of an individualized content (content that emphasizes previously learned pupil skills) and an individualized strategy (strategy that includes favored learning style components only). An experience which is relatively free of tensions issuing from unlearned content and unfavored learning styles is expected to effect a heightened pupil self-image and an elevated degree of pupil engagement in the learning task.

The second instructional treatment consists of an individualized content and a personalized strategy (strategy that introduces the pupil to unfavored learning style components). This treatment precludes tensions arising from unlearned content and activates tensions proceeding from an unfavored learning style. The search for the pupil's learning style strengths and the characterization of the pupil's favored learning style is thus aided.

The third treatment consists of a personalized content and an individualized strategy. Within this instructional treatment matrix, tension is expected to emanate from unknown

content rather than from unfavored style. This method of manipulating tension-producing variables structures a learning situation which should facilitate both a gradual expansion of the pupil's learning skills as well as an equally gradual depletion of his learning deficiencies.

Due to the tensions of unknown content, a decrement in pupil engagement can be anticipated. The duration of this decrement will correspond to the length of time expended by the pupil in acquiring the unknown content and skills. The degree of engagement decrement is not expected to remain constant during this acquisition period. If, in the selection of content for personalization, the criterion of nearly known is applied, there should be a fairly rapid extinction of the decrement. Engagement decrement that is maintained at a constant level during the course of the pupil's exposure to the instructional treatment is indicative of personalized content that is drawn from the pupil's reservoir of the unknown rather than from the pupil's inventory of the nearly known. In such cases, it is imperative to adjust the *What* of the instructional treatment in order to effect the objective of the treatment, i.e., facilitation of pupil acquisition of additional reading skills.

The fourth instructional treatment consists of a personalized content and a personalized strategy. Both elements of the treatment generate tension. However, again by selecting components that are nearest to the known items of content and to the favored styles of learning, it is possible to restrict the degree of tension to a level that is manageable for the child. Although teachers usually view this treatment as providing the pupil with the means for the most rapid acquisition of learning skills, caution must be exercised in its use.

Selection of a fully personalized instructional treatment is dependent on considerable evidence of heightened pupil self-image. Otherwise, the pupil will not be able to cope with both elements of tension in this treatment. Furthermore, at no stage of prescription are fully personalized instructional treatments to be used as the only vehicles for remediation. Personalized treatments are to be administered in a diagnostic plan that is heavily weighted with individualized or partially individualized treatments.

The continual process of diagnosis, as applied to the selection of instructional treatment components, effects refinements in the structure of these treatments. Observation, evaluation and diagnosis of a pupil's behavior in using a fully individualized treatment may thus indicate the pupil's need to have one component of the strategy personalized. For instance, a pupil may have sustained a behavior pattern demonstrating engagement, facility in the use of skills and strength in understanding content. No evidence of tension has been noted in the pupil's repeated exposure to instructional treatments of the following individualized dimensions: Basic Skill 2—Language Analysis; Subskill 1—Consonants: Sequential Level 1—Grades 2 and Below; Instructional Setting 2—Student Self-Instruction; Instructional Mode 4—Test Response; Sensory Modality Input 4—Visual; and Sensory Modality Output 2—Motoric Response (gestures and movement).

Such sustained appropriate pupil behavior now warrants initiating the personalization process. Five personalization options are available: to personalize the entire treatment (both content and strategy), to personalize content but not strategy, to personalize strategy but not content, to partially personalize content but not strategy and to partially personalize strategy but not content. In all but the first of these options, one segment of the instructional treatment is held constant while the other is manipulated.

The extent of taxonomic component manipulation is determined in part by the pupil's frustration level which, in turn, seems to be in direct proportion to the size of the pupil's reservoir of known content and the number of favored wavelengths available to the pupil for the reception of information. Frustration level functions somewhat analagously to a thermostatic device; it seems to control the length of time the pupil can sustain his attention to an instructional task. A low frustration level restricts the temporal dimensions of the

instructional act while a high frustration level expands the dimensions, thereby allowing the pupil time to maneuver his strengths in the performance of the task.

Then, as a rule, the more extensive the pupil's reservoir and number of favored wavelengths, the greater the degree of personalization that can be applied to the selection of instructional treatment components. Since relatively few pupils in the target population have the resources to warrant rapid personalization of instructional treatment, it is a fairly consistent staff practice to personalize one or two taxonomic components at a time.

To illustrate the initiation of the personalization process for the pupil having the previously described fully individualized treatment, the decision is made to personalize only one component of the strategy, Instructional Method. The reasons for this are that the pupil has a meager inventory of strengths in content and skills, and an even greater paucity of nearly known content and skills. Both of these assessments tend to restrict advancement in the segment of the instructional treatment that deals with content.

Although this pupil has demonstrated the use of only one favored wavelength, there has been an accumulation of data that shows pupil movement from Teacher-Student (1) to Student Self-Instruction (2) in the fourth component of the Taxonomy, Instructional Setting, which represents, in the opinion of the staff, the order of social development.

In addition, this pupil's social development has high priority in prescribing instructional treatment; he is too isolated from peer interaction. Therefore, Instructional Setting is changed to Student-Student, Parallel (3), the rank in social development which requires the pupil to exert some social control in a peer setting. The pupil's instructional treatment now reads as follows: Basic Skill 2—Language Analysis; Subskill 1—Consonants; Sequential Level 1—Grades 2 and Below; Instructional Setting 3—Student-Student (Parallel); Instructional Mode 4—Test Response; Sensory Modality Input 4—Visual; Sensory Modality Output 2—Motoric Response (gestures and movement).

This slight change in instructional treatment is followed by observations of the pupil's performance in order to note behavioral differences that are precipitated by the change. Behavioral differences become the subject of questions, diagnosis and evaluation. The decision to retain or delete the personalized change in the instructional treatment is then based on the results of the investigation.

The preceding description of the taxonomic decision making process, as applied to the selection of personalized instructional treatment, is a deliberately simplified version of the actual process. There are other factors significant to the selection of taxonomic components. These factors stem from the complete gamut of learning behaviors which is used as the structure for more refined levels of decision making. Delineation of these structures is reserved for the section on strategy.

Reference has been made to the project's system of qualifying, through a series of questions, the objective assessments of the pupil's test performances. This procedure is supplemented by an evaluation standard of two dimensions, expectancy and suitability. When used in describing pupil-learning behaviors, expectancy and suitability suggest the contexts in which the behaviors are being viewed. Expectancy evokes the past in terms of the present and suitability the present in terms of the future. What is expected of the pupils in the target population is the unsuitable behavior patterns common in the past. What is suitable for the pupils is both the near- and long-term objectives of the project's remedial procedures, i.e., the development of copying mechanisms that are suitable within the school setting and are transferable to settings beyond the school.

By pairing the factor of expectancy with that of suitability, four descriptive categories of learning behaviors are evolved: **Expected and Suitable, Expected and Unsuitable, Unexpected and Suitable** and **Unexpected and Unsuitable.** The second category, Expected and

Unsuitable, is a generalization that can be made about the learning behavior of the target population. Nonlearning, disordered behavior patterns are expected of the population, even though these patterns are unsuitable in the classroom. The intent of the project's decision making process in the selection of instructional treatments is to mediate for expected-suitable and unexpected-suitable classroom behavior.

A fully individualized instructional treatment which draws on the pupil's learning strengths for content and its reception should effect expected-suitable learning. If the individualization phase of instructional treatment is of sufficient magnitude to provide the pupil with a large number of successful learning experiences, the previously rare instances of expected-suitable patterns occur with a frequency that facilitates the habituation of this new pattern. Thus, individualization of instructional treatment mediates for expected-suitable learning patterns by insuring the production of suitable pupil-learning behaviors, either expected or unexpected.

Since the content and style of personalized instructional treatments are drawn from the pupil's reservoirs of nearly known content and unfavored style, a sequence of pupil-learning behaviors, described in terms of expectancy and suitability, evolves from the personalization process that is different from the one evolved from individualization. The sequence engendered by personalized treatments is: expected-unsuitable, unexpected-unsuitable, expected-suitable and unexpected-suitable.

It is to be understood that the pupil's learning behaviors thus engendered do not necessarily follow the same order of the described sequence nor is each step in the sequence an absolute outcome of the process. If a personalized instructional treatment produces an unexpected-suitable learning pattern with marked frequency, the term unexpected is changed to expected and eventually the behavior pattern is described by the category of expected-suitable. Furthermore, when a personalized instructional treatment always elicits expected-suitable behavior, the personalized components of the treatment that are fundamental to the pupil's successful learning experience are shifted to the pool of taxonomic components that are available for individualized treatments. In other words, the personalized components are incorporated into the inventory of pupil-learning strengths, thereby becoming taxonomic components of individualized instructional treatment. The components for individualization increase as rapidly as the components for personalization of instruction lose their effectiveness to elicit either expected- or unexpected-unsuitable learning behavior.

Elicitation of unsuitable behavior, either expected or unexpected, based on a knowledge of the pupil's behavioral deficiencies, is the general criterion for the selection of personalized instructional treatments; elicitation of suitable behavior, either expected or unexpected, based on the pupil's behavioral strengths, is the general criterion for the selection of individualized instructional treatments. Once the pupil habitually exhibits expected-suitable behavior patterns in the school context, it is hypothesized that there will be a generalization of such patterns to other environments. The school year of 1970-1971 has tentatively been scheduled as the period in which the data for confirmation or rejection of this hypothesis is to be accumulated.

The application of the project's diagnostic and evaluative systems to the instruments in the test battery yields data that are germane to both content and its reception in the taxonomic decision making process for the selection of individualized and personalized instructional treatments. The nature of all the data will be noted in this section. The major focus of the discussion will be on the data that is relevant to the selection of taxonomic components of content (the *What* of instruction—Basic Skill, Subskill, Sequential Level, the first three divisions of the Taxonomy). Clarification of the data that is used in the selection

of taxonomic components for the pupil's reception of the content (the *How* of instruction—Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output, the last four divisions of the Taxonomy) is reserved for discussion in the section on strategies.

The Gates-MacGinitie Reading Test is designed to quantify, in school grade terms, a pupil's reading levels in the performance of two types of reading tasks, word recognition (vocabulary) and comprehension. Data beyond the level of quantification can be obtained by two processes of analysis. The first is the application of a set of questions to both scores and the relationship of the scores to each other. The questions are designed to assess the positive elements of the scores and, in so doing, define the negative aspects as well.

The positive test score elements represent the pupil's learning strengths. From the results of this analysis, an inventory of pupil strengths is developed and individualization of content is initiated. The negative test score aspects, evolved incidentally in the course of the search for pupil strength, represent pupil deficiencies, i.e., the body of content and skills the pupil does not know.

Between the known and the unknown of the pupil's content and skills, there is a body of information that is of considerable significance to the development of taxonomic instructional treatments for the pupil. This information is tapped by the second process of analysis in which the pupil's test responses are analyzed along a four point evaluation scale of key response, near key response, distant response and most distant response. The results of this analysis represent an inventory of pupil nearly known learning strengths. It is with items of nearly known that personalization of content is initiated.

This paragraph illustrates the application of the questions to a pupil's test scores on the vocabulary and comprehension sections of the Gates-MacGinitie Reading Test and their relationship to each other. It is the positive aspects of the investigation that characterize these questions as "if yes, then" questions. An answer of *yes* to a question indicates evidence of pupil-learning strength and requires that the next question explore the dimensions of that strength. The answers are supplied in the "if yes, then" format in order to focus attention on the nature of the questions and the sequencing and essence of the data the questions evoke. First, the questions are used in association with the pupil's vocabulary score, then with the comprehension score and finally, if a differential exists between the two test results, in a comparative analysis.

Question: Is there evidence of learning strength in the pupil's score of 6.5 on the word recognition section of the test?
Answer: Yes.

Question: Then, to what degree and extent is the strength evident?
Answer: To a considerable degree; the pupil's score is above his 5th grade level placement. The extent of the pupil's learning strength is not yet known since the scores on the entire test battery have not been assessed for comparability.

Question: Is there anything in the pupil's cumulative record that warrants expectancy of the current strength?
Answer: Yes. The record shows that the pupil made considerable academic progress in previous grades.

Question: Then, to what degree and extent does the current evidence support the expectancy?
Answer: To a lesser degree than the records indicate. The pupil's score demonstrates a less substantial gain (6 months) in the past year than in any of the previous years. The decrement in the scope of the gain may be found in the analysis of the pupil's test responses. Or possibly, the decrement is the effect of pupil-learning behaviors beyond the academic arena.

Question: Is the learning strength suitable to the pupil's age?
Answer: Yes.

Question: Then, is the strength suitable to the pupil's potential?
Answer: No. The pupil's word recognition score is not commensurate with the recorded Intelligence Quotient scores.

Question: Then, to what factors is the differential attributable?
Answer: To a wide range of possible factors which are not available at this level of diagnosis.

Question: Is the suitability factor of the strength consonant with the pupil's self-image?
Answer: Yes. The pupil has a high opinion of his intellectual ability.

Question: Then, is this factor consonant with the parents' expectations for the future of the child?
Answer: This information is not available.

Not much specific data are derived from this part of the investigational survey. However, the collection of specific items of information is not the object of this procedure. Rather, the procedure is intended to produce a broad outline of the pupil by moving from the discreteness of the score to the generalities that can be drawn from an analysis of the score in a number of different contexts.

At this point in the diagnosis, it can be stated tentatively of the pupil that there is a considerable strength in language analysis; this strength is above expectation for the pupil's age group and grade placement. The pupil has developed a good self-image and, therefore, expects that he will do well on reading tests. These self-expectations are well-founded as the record shows above-average reading achievement throughout the previous grades. These are the positive elements that have been garnered by the investigational survey.

In contrast, there are also a few negative elements. Although the pupil comes close to scoring at the ceiling of the test (6.5 as against 7.0 for the test ceiling), the mistakes represent gaps in, or possibly the limits of, the pupil's strength in language analysis. Specification and interpretation of the nature of the errors are sought in the analysis of pupil test responses. Another negative element is the inconsistency of the 6.5 score to the expectancy and suitability levels of the pupil's high IQ. Finally, the records show a decrement in the scope of the pupil's reading achievement gain.

These positive and negative findings are significant in the decision making process by which instructional treatments are selected for the pupil. The positive findings indicate a large reservoir of known skills and content for individualization of instructional content. The level at which to begin language analysis instruction is specified. The pupil's good self-image

and intellectual resources suggest a treatment sequence more weighted with personalized than individualized content and a short period of individualization. For this kind of pupil, prolonged individualization of content may effect a decline in motivation. The negative finding of a decrement in reading gain magnitude, when specified as to cause, may call for modification of the treatment sequence suggested above.

The next step in the investigational survey is to apply the following set of questions to the pupil's comprehension score.

Question: Is there evidence of learning strength in the pupil's score of 5.1 on the comprehension section?
Answer: Yes.

Question: Then, to what degree and extent is the strength evident?
Answer: To an average degree; the pupil's score conforms to his grade level placement. The extent of the pupil's learning strength in comprehension is not yet known as the scores on the entire test battery have not been assessed for comparability.

Question: Is there anything in the pupil's cumulative record that warrants expectancy for the current strength?
Answer: Yes. The record shows that the pupil achieved grade level comprehension scores on previously administered reading tests.

Question: Then, to what degree and extent does the current evidence support the expectancy?
Answer: To the same degree as the records indicate.

Question: Is the learning strength suitable for the pupil's age?
Answer: Yes.

Question: Then, is the strength suitable for the pupil's potential?
Answer: No. The comprehension score is below what would be commensurate with the IQ scores recorded for the pupil.

Question: Then, to what factor is the differential attributable?
Answer: To a variety of possible factors which are not specifiable at this level of diagnosis.

Question: Is the suitability factor of the strength consonant with the pupil's self-image?
Answer: Yes. Although there is a considerable differential (1.5) between the two scores, the pupil shows no dissatisfaction with the comprehension level. It is possible that the pupil has not been made aware of the situation either by self-perception or by being informed of the differential by the school.

Question: Then, is this factor consonant with the parents' expectations for the future of the child?
Answer: This information is not available.

Two positive elements are suggested by this diagnostic procedure. First, average strength is evident in the pupil's comprehension score. Second, the pupil's self-image does not seem to be affected by the reduced level of achievement in reading comprehension. However, assuming pupil awareness of the differential between scores, it is possible that the pupil's indifference is more ostensible than actual. Therefore, implications for instructional treatments based on unimpaired pupil self-image must be used with caution in the decision making process. Two significant negative findings have followed from the application of the questions to the pupil's comprehension score. The first finding is the achievement differential existing between the pupil's scores on comprehension and word recognition, the latter being the higher of the two scores. The second is the substantial discrepancy between the pupil's comprehension score and the achievement level that is expected and suitable for a pupil of such intellectual potential.

Both the positive and negative findings provide the outline of the area from which to select content and skills for the instructional treatment for comprehension. The fifth grade is the level at which instruction is initiated. Since the scope of the knowns in comprehension is average, the period of time prescribed for individualized treatment of comprehension is to be protracted. When personalization is initiated, the pupil will receive treatments only personalized partially, and these infrequently. For example, if the Subskill (taxonomic component 2 in the *What* of instruction) is to be personalized, the Sequential Level of instruction (component 3 in the Taxonomy) is lowered (individualized) in order to increase the probability of pupil success in using the treatment; also, the Sequential Level of instruction can be raised above fifth grade, thereby personalizing this taxonomic component, while the Subskill remains individualized by restricting the skill area to the known. This cautious approach in dealing with the degree and scheduling of personalized treatment allows for the accumulation of additional data that may signify the causes of the pupil's retardation in reading comprehension.

In order to derive as much information as possible from the scores, the differential is subjected to the questioning procedure. The questions and answers for the same pupil are presented below.

Question: Is there evidence of a differential in the two reading scores?
Answer: Yes. A differential of 1.5.

Question: Then, is the size of the differential significant?
Answer: A differential of this size is not uncommon to this population, and the nature of the differential is usually the same as this pupil's with the comprehension score showing a regression in the pupil's performance. Such a differential is more common to lower levels of achievement in word analysis and usually reflects a pupil's struggle to apply primitive word analysis skills to words in context. Furthermore, it is felt that this size differential would be a rare occurrence in a population with above average intelligence. Therefore, the question of significance seems to depend on the population in which the pupil is placed.

Question: Are there any other facts that may be significant to the situation?
Answer: Yes, the pupil has a Spanish name and he used only half the allotted time to finish the test.

Question: Then, is it suggested that the differential represents a language barrier?
Answer: There is this possibility but the degree of bilingualism in the home is not noted in the pupil's record. This information is being sought through appropriate channels.

Question: Is it possible that the pupil's rapid test performance indicates poor motivation?
Answer: Yes. But the nature of the rapid performance, i.e., whether rapidity is characteristic of the pupil's test taking style or just a by-product of this particular test taking instance, needs to be known before adequate inferences can be drawn.

Question: Is this information available in the pupil's records?
Answer: No. Such data is not available. At this time, all that can be said is that although the rapidity suggests poor motivation, it is also suggestive of other conditions such as fear, poor test taking habits, too much self-assurance, the desire to be doing something else, etc.

Question: Is there evidence when the differential first appeared?
Answer: Yes. A slight differential is recorded at the end of the second grade and is seen to widen from that grade on.

Question: Then, what inference, if any, can be drawn from the gradual growth of the differential?
Answer: The appearance of the differential in a primary grade and its gradual growth in the succeeding grades seems to lend support to the presence of a language barrier.

Although the information that has evolved from the questioning process is not definitive, it does suggest a direction for the personalization of content in comprehension. At the present time, a language development deficiency seems to be the primary cause for the pupil's depressed comprehension score. Therefore, it is of paramount importance to separate the known and nearly known from the totally unknown before proceeding to the personalization of treatment in the comprehension area of instruction. This separation process is advanced by the next diagnostic step, i.e., the analysis of pupil test responses along one of two possible four-point scales depending on the form of the Gates-MacGinitie Reading Test used to evaluate the pupil's functional reading capacity. This analysis begins with the pupil's responses on the vocabulary section of the Gates-MacGinitie Reading Test.

Each of the forty-eight items on the Gates-MacGinitie Vocabulary Test Form B is illustrated and provides a choice of four responses, one of which is the key response in that it "goes best with the picture . . . ." This design lends itself to analysis on a four-point scale of key response, near key response, distant response and most distant response. The analysis can reveal the pupil's cognitive patterns in selecting the appropriate response and assess language competency that is related to the pupil's ability to label the items' illustrations.

In Form C of the Gates-MacGinitie Vocabulary Test, only the first twelve of the fifty-two items are illustrated. From the thirteenth item on, the test stimulus is a bold-faced printed word followed by a choice of four responses, one of which "means most nearly the same as" the stimulus. Analysis of pupil responses on this test design is not adequately accomplished by the previously described method. Instead, another four-point scale was

devised for application to Form C pupil responses. In devising this scale, each test item from the thirteenth to the fifty-second was categorized according to the tangibility intrinsic to the meaning of the stimulus word. The items were found to be either tangible or intangible. Also, it was possible to specify the condition of tangibility as being either objectively tangible or situationally tangible. In other words, the meaning of each tangible test item could be externalized as an illustrative object or situation.

At this phase of development, the scale had three points: objectively tangible, situationally tangible and intangible. One additional dimension required further exploration. The meaning of a situationally tangible item could be externalized as either an expressive emotion or a distinctive action. Therefore, items previously classified as situationally tangible received more definitive classification as either situational–emotionally tangible or situational–performably tangible. Thus, the four-point scale provides the Form C Vocabulary Test items with an analytical procedure of the following contours: objectively tangible, situational–emotionally tangible, situational–performably tangible and intangible.

It is suggested that the four points of the scale are hierarchically ordered as to conceptual difficulty. To further an understanding of the four-point scale, a test item, illustrative of each category, is presented for consideration.

13. *church: fox/rose/building/green*

This item is classified as objectively tangible; the meaning of the word *church* can be objectified in the mind or on paper as a building with a steeple or a store front marked with a cross.

36. *sorrow: bird/secret/grief/magic*

This item is classified as situational–emotionally tangible; the meaning of the word *sorrow* can be objectified in the mind or on paper in a number of ways: a tear-stained face or a human figure bent over a dead body in the traditional posture of mourning.

42. *gossip: syrup/hurry/confiscate/chatter*

This item is classified as situational–performably tangible. The mental or actual picture of two persons furtively talking about a third captures the essential meaning of the word *gossip.*

48. *absurd: distant/ascent/absent/foolish*

This test item is classified as intangible; the abstraction level of the word *absurd* is such that its meaning is neither mentally nor physically perceivable as an object or situation.

Of the forty nonillustrated test items in the Gates-MacGinitie Vocabulary Test, Form C-1, twenty-six are of a tangible nature and fourteen of an intangible nature. Of the twenty-six tangible items, sixteen can be objectified by objects, ten by situations. Out of the ten situational test items, three can be depicted as either emotional facial expressions or emotional settings and four as performable actions. One more point needs to be noted about the sixteen items that are objectified. Of these sixteen items, five are attributes of objects.

When this frame of reference is applied to the pupil whose test scores have been previously discussed, it is apparent that of the pupil's six inappropriate responses, one can be classified as objectively tangible while the other five are intangible. In reviewing the five intangible items, one error can be attributed to inadequate perception of the stimulus word. Test item 49 has, as the stimulus word, *ghastly* followed by these four choices: *imaginary/white/dripping/horrible.* The pupil circled the word *imaginary.* Apparently, *ghastly* was

perceived as *ghostly*. The objectively tangible item, 37, in which the pupil associated the stimulus word *vegetation* with *alliance* as the response choice instead of *planting* indicates inadequate use of root words. When the pupil's responses are subjected to the project's questioning procedure, certain cognitive patterns evolve that are of significance in the selection of individualized and personalized instructional treatments.

Question: Is there evidence of cognitive strengths?
Answer: Yes. The pattern of errors suggests that the pupil is capable of handling objectively and situationally tangible vocabulary.

Question: Then, is there a pattern of cognitive weakness that is apparent?
Answer: Yes. The errors suggest that the pupil does not handle intangible vocabulary items with the same degree of capability as tangible items.

Question: Then, to what degree and extent is this weakness apparent?
Answer: The weakness is not present throughout the intangible items in the test.

Question: Then, is there evidence of strength in the pupil's performance with intangible items?
Answer: Yes. Of the fourteen intangible words on the test, the pupil gave inappropriate answers to five. Therefore, there is a higher proportion of strength than of weakness.

Question: Then, is there some consistency in the pupil's error choice that can be utilized in remediation?
Answer: Yes, but the evidence is not extensive. For one test item of the five intangible words, 49, inadequate word perception has been advanced as the possible explanation of the error. Of the four remaining test items, only two suggest a pattern of error. In 48 and 51, the pupil chose test responses that are configurationally close to the stimulus words, i.e., *absent* for *absurd*, *elegant* for *efficient*.

Some positive findings are indicated by this questioning process. The first is the pupil's ability to handle words having a high degree of tangibility. The second is the pupil's slight difficulty with intangible words. Thus, individualized prescriptions for content in word meaning should be drawn from the pupil's reservoir of highly tangible words and known intangible words. In addition, the information derived from an analysis of three of the pupil's error responses provides some insights for the selection of personalized content in comprehension. One of the error responses demonstrated inadequate word structure skills; the two others suggested that the pupil substitutes primitive configurational cues for definitional cues when the latter are not available. This regressive practice indicates two skills for personalization. The first confirms the need to initiate personalization with simple word structure skills; the second suggests that the pupil be taught selection of response through the process of elimination.

The four-point scale that is used in analyzing the vocabulary items is not applicable to the Gates-MacGinitie Reading Comprehension Test, Form C-1. Therefore, another system is presented for use in analyzing the pupil's responses to the comprehension items. The test consists of twenty-four short paragraphs, each having two questions for a total of forty-eight items. Tentatively, thirty-eight of the test items can be classified in the following manner:

fifteen items require the pupil to select the main idea of the paragraphs; eight items require recall of given simple details; six others require recall of complex details and nine present the pupil with the task of selecting responses on the basis of implied information.

The fifteen main-idea items involve synthesizing given parts to form the ungiven whole. Therefore, the pupil is required to use inductive reasoning. An example of this kind of comprehension item is paragraph 1 on Form C-1:

1. First, Mother measured the milk, baking powder, shortening, flour, and sugar. Then, she mixed these together with two beaten eggs. Finally, she poured the batter into a pan and put the pan into the oven.

   A. Mother was making

   a cake  a dress  soup  the beds

Paragraph 11 on Form C-1 typifies the test items that require the mental process of simple recall of a given detail. The key response is the same word that is used for labeling the detail in the paragraph. The process that is required by the question is actually one of recognition rather than recall.

11. Every morning Janet put sunflower seeds and suet in the bird feeder outside the window. Soon, with the help of a bird book, Janet could identify fourteen different kinds of bird visitors.

    A. What did Janet use to identify unknown birds?

    microscope  museum  numbers  book

The other items of recall, fourteen in number, are considered more complex because the questions involve at least one additional mental process in selecting the key response. In paragraph 4, selection of the key response is reached through the process of elimination. Actually, this test item requires recognition of both given and omitted details.

4. Ruth was busily getting her costume ready for the party. She had already made a tall pointed hat out of black paper. She and her mother had just finished a long black cape. The broom that she would ride was standing in the corner.

   B. Ruth still needed a

   hat  cape  broom  mask

Another complex recall item is found in paragraph 19 in which the recognition of a given detail is complicated by the use of synonymous terms in paragraph and response choice rather than exact terms.

19. If a bronco buster wants to win a rodeo contest, he must observe the contest rules. One of these rules is that the rider must keep one hand in the air. A rider who does not do this is disqualified.

B. In a rodeo contest a bronco buster must keep one hand

under still free hold

To select the key response of "free," the pupil must be cognizant of the synonymity of this term to the phrase "keep one hand in the air" in the paragraph. Other items of this kind have different cognitive features, but all such items can be similarly as complex recall since selection of a given specific detail is the task requirement of each. In the last test-item classification, the task requirement is to select responses on the basis of information that is implied rather than explicitly stated. In order to do so, the pupil must be able to arrive at a conclusion, i.e., draw an inference, from the given data or premises. Paragraph 12 exemplifies this kind of task requirement.

12. John was making a paper bag mask. His father cut out holes for his eyes and mouth. Then John drew a face with yellow and black stripes, long black whiskers, and orange ears. When the mask was finished, he put it on and went to find his brother so he could roar at him: "Grrr!"

A. John pretended to be a

tiger clown bear ghost

The four-point scale to be used for analysis of the pupil's responses on the comprehension test is as follows: main ideas, simple recall, complex recall and inferences. Admittedly, this is a simplification of the design in which the Gates-MacGinitie Form C-1 test items are organized, but it is this very simplification that facilitates analysis of pupil responses for evidence of performance patterns. Consequently, the application of this four-point scale to the comprehension responses of the pupil being used as an example gives a profile of comprehension abilities that are in disequilibrium. The pupil's score is fourth grade, seventh month (4.7) which represents an error score of twelve. When the twelve inappropriate responses are classified on the basis of the four-point scale, it is demonstrated that the pupil responded appropriately to all of the eight simple recall test items, to thirteen of the fifteen main idea items, to twelve of the sixteen complex recall items and to three of the nine inference items.

The expositive value of this data is gained by the use of the project's questioning procedure.

Question: Is there evidence of strength in the pupil's profile of test responses?
Answer: Yes.

Question: Then, to what degree and extent is the strength evident?
Answer: In two comprehension skill areas, simple recall and main ideas, the degree of ability is high. But this functional level does not extend to the two other areas of the four-point scale, namely, complex recall and inference.

Question: In the two other less highly developed comprehension skill areas, complex recall and inference, are there any patterns of strength or nearly achieved strength that can be utilized in the decision making process for the selection of instructional treatments?

Answer: Yes, there is some strength in the pupil's performance of complex recall items.

Question: Then, to what degree and extent is this strength evident?
Answer: To a significant degree since the pupil responded appropriately to twelve of the sixteen complex recall items. However, the strength does not extend to all kinds of complex recall items found in the test.

Question: Is there an error pattern evident in the pupil's inappropriate responses?
Answer: No. There are too few items to indicate an error pattern.

Question: Can the inappropriate nature of the pupil's responses by specified?
Answer: Yes, to some extent.

Question: Then, what statements describe these errors?
Answer: One inappropriately answered complex recall question involved specifying a detail through the process of elimination. Three of the four choice responses are given as details in the stimulus paragraph; the fourth is not given. The question calls for the selection of the detail that is not mentioned in the paragraph. It is only through the process of elimination that the key response can be selected.
Another inappropriately answered complex recall question involves the selection of a response that represents the aggregate of five details in the paragraph. The pupil, in selecting his response, overlooked one of the details.
The other two errors are of similar nature and provide additional support for the previously advanced possibility of a language development deficiency. The first of these items requires the selection of a response that is couched in synonymous terms to the description of the detail in the stimulus paragraph. In other words, the pupil did not recognize the equivalency of the terms. It is also possible that the meaning of the response choice was not known to the pupil. In either case, a language deficiency is indicated. In the second item, the task is to establish the referent of a phrase. It is apparent from the inappropriateness of the response that the pupil was unable to secure the relationship; this further suggests language deficiency.

The foregoing procedure offers some directions for the individualization and personalization of content in comprehension. Since individualization proceeds from learning strengths, individualized treatments for this pupil will emphasize recall of simple details and identification of explicitly stated main ideas. Building slowly on this base of simple details and main ideas, the process of personalizing instructional treatment can be initiated by elevating the level of vocabulary in the items that are presented to the pupil. Thus, personalization would begin in one taxonomic component, Sequential Level, the third taxonomic component.

Personalization can be advanced by prescribing treatments that incorporate both simple recall and main idea identification. In these treatments, it is the taxonomic component of Subskill, the second taxonomic component, that is being manipulated. When the treatment is a combination of tasks, the Sequential Level is lowered to fourth grade. These treatments are representative of partial personalization. The next personalized step is

treatment that combines the two skills in association with an elevated level of vocabulary.

The next advancement is drawn from the near strengths that the data indicate are present in the pupil's responses to complex recall of details. Since this kind of task requires an intervening reasoning process before the detail can be specified, the vocabulary level is lowered again. There is continual fluctuation in the vocabulary level. The greater the difficulty of Subskill, taxonomic component 2, the lower the Sequential Level of the vocabulary, taxonomic component 3. As the pupil accommodates to the difficulty level of the Subskill, the gap between the vocabulary level and the pupil's grade placement is decreased.

The quantity of tasks included in a single personalized treatment is to be manipulated also. It is the degree of strength the pupil has demonstrated in handling a task that determines the number of tasks to be incorporated in a treatment, i.e., the less the strength, the fewer the tasks.

The final phase of personalized treatment is directed toward improving the pupil's ability to draw inferences. The manipulation of vocabulary level and task quantity is just as relevant to this personalized treatment as it is to the others.

Diagnosis and data collection continue with an analysis of the Wepman Auditory Discrimination Test. This test consists of forty items, each a set of paired words. The pupil's task is to discriminate aurally whether the paired words are the same or different. The appropriate pupil response to the items is *same* or *yes* if the pairs consist of the same word; test item 34—*badge-badge*—illustrates this type of task. *Different* or *no* are the appropriate pupil responses to items in which the pairs consist of dissimilar words; item 1—*tub-tug*—is an example of a pair requiring aural discrimination of a difference in the stimulus words.

A score on the Wepman represents the number of errors the pupil makes in discriminating the likeness or difference in the stimulus words of the pair. There are two such scores, one for errors in discriminating paired-same stimulus words, the other for errors in discriminating paired-different stimulus words. For the paired-different stimulus words, Wepman specifies a norm of no more than three errors for children eight years of age and older. In addition, a score of fifteen for such items is considered by Wepman to be invalid. A score of this error magnitude suggests that the pupil does not understand the concepts of *same* and *different*. However, it is not uncommon for pupils in the target population to score close to the level of invalidity, not necessarily because of a lack of comprehension of the test's conceptual framework but rather as an effect of the cultural speech patterns to which the pupils are exposed.

Therefore, to a large extent, the pupil's auditory discrimination score supplies little information for the decisions that are made in the selection of instructional treatments. But the yield of information is enlarged by the application of the project's questioning procedure to the pupil's score. The pupil under examination has achieved a score of three on the paired-different stimulus words which is designated as the pupil's X score. The Y score, pupil errors on paired-same stimulus words, is zero. Below is the questioning procedure as it applies to the pupil's X score of three.

Question: Is there strength evident in the pupil's X score?
Answer: Yes.

Question: Then, to what degree and extent is the strength evident?
Answer: The strength is evident to a marked degree not only in the X score but extends to the Y score as well.

Question: Is this level of performance to be expected of the pupil?
Answer: There is justification for both a yes and no to the question.
A yes is based on the pupil's score (5.9) on the Gates-MacGinitie Vocabulary Test which suggests adequate auditory discrimination.
A no is predicated on previously accumulated data that suggest a deficiency in the pupil's language development. The possibility of a language deficiency which is supported by the pupil's depressed comprehension score is not negated by the pupil's X score on the Wepman.

Question: Is this level of performance suitable for the pupil's needs now and in the future?
Answer: Yes to both parts of the question. The pupil sees himself as being upwardly mobile.

The questioning procedure is terminated in order to classify the pupil's test responses according to the nature of the auditory discrimination that is required by the test item. The Wepman word sets lend themselves to placement in four classes of auditory discrimination. Of the forty items, four consist of phonemically similar words which differ in the medial (vowel) position. Item 40—*pen-pin*—illustrates medial (vowel) auditory discrimination. Of the thirty-six remaining items, ten are paired stimulus words which require auditory recognition of similar words. Item 38—*pose-pose*—is typical of this auditory task. Thirteen of the remaining twenty-six items are pairs of phonemically similar words that differ only in the initial consonant position. Item 22—*din-bin*—is representative of this class of auditory discrimination. The remaining thirteen items are pairs of phonemically similar words that differ in the final consonant position. Item 1—*tub-tug*—illustrates the class of auditory discrimination which focuses on changes in the final position.

Several assumptions are made in applying the classification system to a pupil's responses. For instance, if a pupil's response to item 3—*web-wed*—is *same*, it is assumed that the inappropriate response indicates pupil disability in aural discrimination of final consonant sounds. The reverse of this example is also assumed. If the pupil's response to item 3—*web-wed*—is *different*, then it is assumed that the pupil can aurally discriminate final consonant sounds. Similar assumptions are made for two other classes of auditory discrimination, aural changes in the initial consonant position and medial vowel position.

It is not possible to make assumptions from inappropriate responses to items of paired-same stimulus words. A response of *different* as the pupil's response to item 14—*jam-jam*—offers no implications as to the location of the pupil's error in aurally discriminating the sameness or differentness of paired stimulus words. Therefore, the Y score items are given no further consideration in the analytical processes to which the X score items are subjected. The items contributing to the pupil's X score are classified in accordance with the structure described above: errors in aural discrimination of initial consonants, errors in aural discrimination of final consonants and errors in aural discrimination of medial vowels. Patterns of aural discrimination strength and weakness in the pupil's performance are established by this classification process.

Classification of the responses given by the pupil having an X score of three to the Wepman X type test items delineates a pupil's aural discrimination profile of the following dimensions: eleven appropriate responses to the thirteen X type test items requiring aural discrimination of consonantal differences in the initial position, twelve appropriate responses to the thirteen X type test items that require aural discrimination of consonantal

differences in the final position and four appropriate responses to the four X type test items requiring aural discrimination of vocalic differences in the medial position. The significance of the pupil's aural profile to the decision making process in selecting instructional treatment for the development of aural discrimination evolves from the questioning procedure as it is applied to the data mentioned above.

Question: Are there any patterns of aural discrimination strength in the pupil's performance of the Wepman?
Answer: Yes.

Question: Then, to what degree and extent are the patterns of aural discrimination demonstrated?
Answer: The patterns of strength are markedly present and extend throughout the different types of auditory discrimination included in the test.

Question: What significance do these patterns have for the selection of instructional treatment?
Answer: The patterns suggest that aural discrimination tasks form part of the reservoir of known from which individualized instruction is drawn.

Question: Then, is there any feature of the pupil's three X type error responses that indicates direction for the selection of treatment?
Answer: Yes. The three Wepman errors are characteristically very similar. In fact, two of the test items require aural discrimination of the phonemes /v/ and /ð/ (voiced th). Item 9 has the consonants in the initial position—*vow-thou* —while item 25 has the same pair in the final position—*clothe-clove*. Both of these phonemes are voiced fricatives and, therefore, are sounds of relatively low intensity and high frequency. The phonemic pair in item 32—*fie-thigh*—is the third aural discrimination error. The error is present in the initial position only, for the pupil responded appropriately to the paired consonants in the final position: item 28—*sheaf-sheath*.
These phonemes are also classified as fricatives but they are voiceless and have the same low intensity and high frequency characteristics as the other phonemic pair.
In addition, none of these phonemes, with the exception of /ð/ (voiced th), are used very frequently in spoken English. Therefore, a child has less occasion to discriminate these sounds aurally. Although /ð/ (voiced th) has a fairly high frequency count in English speech, in certain sectors of the population, this sound is often dentalized to sound like a /d/ and, thus, there may not be much opportunity for the child to aurally discriminate this sound.

These errors suggest aural skill areas that lend themselves to personalized treatment. Remediation can be directed in progressive steps to the aural discrimination of the specific phonemic pairs; initially, each of the sounds should be discriminated in association with a far contrastive (dissimilar) sound. Then gradually the sound should be brought closer to its phonemic mate until the pupil is confronted with the original aural discrimination task that was responded to inappropriately on the test.

Simultaneously with the aural component of the discrimination tasks, the pupil can

receive personalized treatment that emphasizes kinesthetic cues for the discrimination of sounds. For instance, the mouth geography requirements and subsequent kinesthetic feedback for the articulation of fricatives are quite different from the mouth geography and feedback for the articulation of labio-dental sounds.

The pupil can also be taught to supplement aural cues with visual cues derived from lipreading. For this particular pupil, supplementation of aural cues by cues from other Sensory Modality Input channels for the purpose of developing aural discrimination is not of paramount importance because the aural discrimination deficiency is very limited. For pupils with diffuse aural discrimination deficiencies, taxonomic treatment that develops facility in the use of other modality cues to support aural perception is a legitimate course of instruction. For the pupil under discussion, personalized treatment can be extended into areas requiring refined aural discrimination of nuances of thought and emotion that are conveyed by the aural stimuli.

Further expansion of the pupil's data bank is derived from the staff's analysis of the pupil's performance on the project's Diagnostic Reading Test, the third measuring instrument in its test battery.[1] This instrument is designed to establish the strengths and weaknesses in the pupil's word analysis skills.

There is a developmental progression in which word analysis skills should be presented to children. By ascertaining suspensions of continuity in each pupil's word analysis progression, it is possible to develop three sequences of instructional treatments: the first consists of the pupil's word analysis strengths from which taxonomic components for individualization of content are selected; the second consists of the pupil's nearly attained strengths, from which taxonomic components for the personalization of content are selected; and the third reflects the pupil's reservoir of unknown word analysis skills and provides content for the extension of personalization of treatment. The three sequences, coordinated on the bases of the pupil's rate of learning and empirical evidence of improvement in pupil behavior patterns, constitute the comprehensive plan for instruction in word analysis skills.

The test consists of eight parts and is administered individually to the pupil. In the first part, the pupil is asked to give the names of the consonants which are presented as visual stimuli in a disordered series. From the responses, it is possible to determine the degree and extent to which there is pupil knowledge of the grapheme names. Speed of response is a relevant piece of datum that is recorded during the pupil's performance.

In addition, inappropriate responses are analyzed for signs of visual perceptual disability. For instance, pupil responses of *f* for *t*, *u* for *n*, *m* for *w*, and *y* for *h* demonstrate a tendency to reverse letters along the vertical axis, while responses of *d* for *b*, *g* for *q*, *p* for *q*, and *b* for *d* present evidence of visual-perceptual reversals along the horizontal axis. The tendency to reverse graphemes along the vertical axis may be the precursor of an inability to maintain eye movement on one line at a time while reading, while horizontal reversals may signal future directionality difficulties for the pupil.

The second section of part one requires the pupil to make a phoneme-grapheme association for the same visual stimuli. With the exception of the letters *c* and *g*, each of the other consonantal graphemes have only one related sound. In the case of these two letters, the pupil is reminded by the tester that there are two sounds associated with these particular graphemes.

The pupil can perform on one or on several levels of competency. The highest level involves responding to the grapheme stimulus with the related isolated sound. On the next

[1] The project's Diagnostic Reading Test and the Roswell-Chall Diagnostic Reading Test of Word Analysis Skills are very similar. The project's test is not a published item but the Roswell-Chall Test may be obtained from Essay Press, P.O. 5, Planetarium Station, New York, N.Y. 10024.

level, in descending order, the pupil would offer a word that begins with the sound of the grapheme stimulus, i.e., "look" for the letter *l*. The response of a word to the grapheme is acceptable. However, it is recorded that the pupil did not know the grapheme's associated phoneme in isolation. On the lowest level of competency is the inability to offer either a word or a sound in response to the grapheme stimulus.

Analysis of the pupil's performance on the two sections of this first part, ability to recall grapheme names and to make grapheme-phoneme associations, includes a comparison of the performances which, in turn, generates a series of questions; these questions are presented after the test responses of the pupil under investigation are analyzed. This comparison is made in order to determine whether evidence of visual perceptual difficulty is compounded by or associated with the aural perceptual difficulty. For instance, is a response of *d* to the grapheme stimulus of *b* associated in the second task with the phoneme /d/ or /b/? If the response is /d/, then it appears that there is a purely visual perceptual disorder; but if the response is /b/, it would be reasonable to suggest that the disorder is of a combined visual and aural nature. Such differentiations are relevant to the decision making process in the selection of the taxonomic components for the content of instructional treatment. The relevancy goes beyond the taxonomic components of content (the first three divisions of the Taxonomy) pertaining to the fifth and sixth divisions as well, Instructional Mode and Sensory Modality Input.

In the second part of the Diagnostic Test, the pupil is called upon to name the vocalic graphemes, first to articulate the short sound of each vowel, and then to articulate the long sound. In the next task, the tester articulates the short sound of each vowel and the pupil is required to point to the vowel associated with the sound stimulus. The same procedure is used for the long vowel sounds. These two tasks in which the vocalic sounds are presented to the pupil for grapheme identification are essentially tasks of recognition. The two preceding tasks in which the pupil articulates the short or long vocalic sound associated with each grapheme are tasks of recall.

Ability to recall is considered a higher competency level than recognition. If the former is not present but the latter is, then the phoneme-grapheme association of vowels is judged to be a part of the pupil's reservoir of nearly known skills and personalized treatment can be initiated with this content. Responses of vocalic sounds in isolation or embedded in words such as *at* for short a constitute the inventory of pupil strengths from which the content of individualized treatment is drawn.

The two letter consonant digraphs and blends constitute the test items of part three. A record is kept of the facility with which the pupil blends the sounds, whether the blends and digraphs are articulated in isolation or whether the pupil relies on a cue word to retrieve the sounds, and whether the blend is executed without the insertion of a vocalic sound between the consonantal sounds that constitute the blend stimulus, for example /bul/ for /bl/. Blends that are articulated in this manner are considered nearly knowns and form the basis for the content of personalized treatment. The same procedure is used for the triple blend test of part four.

Part five consists of five pairs of words which test whether the pupil has internalized the rule of final *e*. When the letter sequence in a word follows the pattern of consonant-vowel-consonant, the sound of the vowel is usually short, as in *mat*. The letter *e*, placed at the end of the consonant-vowel-consonant sequence, signals its own "silentness" and a change in the medial vowel sound from short to long, as in *mate*. The task requirement in part five of the Diagnostic Test is for the pupil to know both words of the pair in order to receive credit for an appropriate response. Inappropriateness of response is usually concentrated on the second word stimulus of the pair, the final *e* word. An appropriate

response to only the first word of the pair indicates both positive and negative data, the positive data being that the pupil knows that particular word as a sight word, the negative data that the pupil does not know the rule of final *e*.

Part six tests the pupil's knowledge of vowel diphthong and vowel combination sounds such as *ee, ai, oa, ar, oi, ea* and *ay*. In the fourteen test items, there are two different word stimuli for each of these vowel combinations. An appropriate response to one of the two word stimuli for a particular vowel combination is not regarded as an almost known vowel combination sound, but as both an unknown vowel combination sound and a recalled word that is part of the pupil's sight vocabulary. This is another instance of a pupil test response yielding both positive and negative test results upon analysis. This duality is effected by the project's systematic inquiry into the pupil's responses for evidence of both strength and weakness.

Eight multi syllabic test items comprise the seventh part of the test. Of the eight word stimuli, two are compound words, combinations of two simple primary words such as *overlook*, while the remainder present a range of syllabic difficulty from three to four frequently and infrequently encountered morphemes such as *invited* and *resentfully*. Patterns of pupil-learning styles in syllabication and application of word attack skills to syllabication are abstracted by means of the project's system of analysis as applied to the pupil's responses. For instance, it is common to find pupil patterns that indicate ability to handle only the first two syllables of poly syllabic words. Another pupil pattern may signal adeptness in handling initial and final syllables only, the medial syllables being omitted from any word attack procedure. Other patterns may suggest language development deficiencies or even visual perceptual difficulties. An example of the latter would be a pupil response of *look over* to the test item of *overlook*. These patterns are subsumed as items in one of the pupil's three inventories, strength, near strength or weakness.

In the last part of the Diagnostic Test, the pupil is assigned the task of graphically reproducing the graphemes, first in upper-case and then in lower-case letters. The pupil's responses yield many different types of data: the wholeness, or lack thereof, of the alphabet sequences, the ability to associate a written symbol with an oral label, indications that visual perceptual disturbances manifested in pupil responses to the test items in section one, part one, in which oral labeling of the alphabet graphemes is required, have their counterpart in the written expression of the letters.

Close observation of the pupil's performance supplies additional information that is relevant to the decision making process in the selection of taxonomic components for the individualization and personalization of instructional treatment.

How long does it take for the pupil to retrieve and reproduce the written symbol? With what degree of organization does the pupil reproduce the letters of the alphabet? Is the pupil's closure of the alphabet sequence so fixed and inflexible that the sequence cannot be penetrated at any point for the retrieval of specific alphabet names and forms? Can the pupil graphically reproduce with dispatch and accuracy any disordered alphabet sequence that is vocally presented or is the pupil capable of reproducing the ordered alphabet sequence only? This information, as well as the previously mentioned data, determines which taxonomic components will be selected for instructional content and strategy.

The essential points of the analytical process described above can be clarified by applying this process to the actual test responses and performance of the pupil who has already been used as a model for the other test battery instruments.

Question: Is there any evidence of strength in the pupil's performance and response to section one, part one of the Diagnostic Reading Test in which he is required to name the graphemes presented visually in a disordered sequence?

Answer: Yes. There is evidence of complete strength as the pupil has scored twenty-one out of a possible score of twenty-one. In addition, his rate of response is excellent.

Question: Then, is there a differential between the pupil's performance on section one and section two of part one in which he is called upon to associate the appropriate sound with the visually presented grapheme?

Answer: No differential is present. The pupil's test responses are completely appropriate, the score again being twenty-one out of a possible twenty-one. The rate of retrieval for responses to these test items is also excellent.

Question: Then, is there nothing apparent in these two sections of the test that indicates an extension into the visual perceptual area of the aural discrimination difficulty with voice and voiceless fricatives that is evident in the pupil's performance on the Wepman Auditory Discrimination Test?

Answer: No. The pupil's difficulty in discriminating the voiced and voiceless fricative seems to be purely of an auditory nature.

Question: Then, are there signs of strength in the five sections of part two which focus on the pupil's vocalic word attack skills?

Answer: Yes. The pupil demonstrates complete facility in terms of accuracy and speed of response in discriminating vowel names and both long and short vowel sounds.

Question: Are the pupil's strengths consonant with the expectancy level that proceeds from his performances and scores on the other instruments of the project's test battery?

Answer: Yes. The 5.9 scored by the pupil on the vocabulary section of the Gates-MacGinitie presents strong indications that he has achieved a high degree of fluency in word attack skills.

Question: Are there signs of strength in the pupil's responses to the test items of two- and three-letter consonant blends and digraphs in parts three and four of the test?

Answer: Yes. The pupil has responded appropriately in terms of accuracy and speed to all nineteen of the two-letter consonant blend test stimuli. Although he has responded inappropriately to all six of the three-letter consonant blend items, there is still evidence of strength in the pupil's responses. In each of the responses to the triple blends, all three sounds are accurate and articulated in the sequence set forth by the test item. The inclusion of a vocalic sound between the second and third letters of the consonant blend effects an inappropriateness of response. For example, the pupil's recorded responses to the test item *str* is *stir.*

Question: Are these test items to be regarded as part of the pupil's reservoir of unknown?

Answer: No. Since the pupil's responses contained the required sounds in the correct sequence, these items are considered part of his reservoir of nearly known and should be used to initiate personalization of instructional content.

Question: Does the pupil demonstrate any strength in part five of the Diagnostic Test which tests his adeptness in applying the rule of final *e* to visually presented paired words?

Answer: Yes. The pupil has achieved a score of four out of a possible five.

Question: Then, does the error response offer any information that may be relevant to the selection of taxonomic components for instructional content?

Answer: The pupil's error response of *cube-cub* to the paired word stimulus of *cub-cube* demonstrates a reversal of the test item order. Nothing definitive can be said at this point about the relevance of the error to the selection of instructional treatment because of the meagerness of the evidence. Nonetheless, this instance of visual perceptual difficulty should be noted and observations made to see if the pupil displays further behavioral examples that confirm this slight evidence.

Question: Then, are there strengths apparent in the pupil's performance on part six of the test?

Answer: Yes. There is only one error response to the fourteen test items, *set* for *seat*. Since an appropriate response is recorded for the test stimulus *beak*, it can be assumed that the *ea* phonic element is almost known and therefore is usable for personalized content. All the other phonic elements can be selected for individualized content.

Question: Then, is there evidence of strength in the pupil's syllabication skills which are tested in section seven of the Diagnostic?

Answer: Yes. Six of the pupil's eight responses are correct.

Question: Then, are there patterns of strength visible in the pupil's appropriate responses?

Answer: Yes. In all the responses, including the inappropriate ones, the pupil demonstrates adeptness in handling initial and final syllables.

Question: Then, is there any information relevant to the selection of content for the individualization of instructional treatment that can be gleaned from the error responses?

Answer: Yes. In both error responses, 'subsituation' for 'substitution' and 'result-fully' for 'resentfully', the inappropriateness of the responses centers on the syllables of the medial placement.

It is worth noting that the pupil's difficulty with medial syllables occurs in words with a syllable count in excess of three. Therefore, two and three syllable words should be used for the content of individualized treatment, and words containing more than three syllables for the content of personalized instruction. Since personalization should begin with almost knowns, the use of two syllable words to which syllables are affixed (invite, invited, inviting, invitingly, invitation) seems an appropriate point of departure.

In addition, the two errors appear to supply confirming evidence for two tentative hypotheses mentioned previously: the possibility that the differential of one year, two months between the scores of the Gates-MacGinitie Reading Tests represents a language development deficiency and the second possibility that the pupil has some visual perceptual difficulty which is evidenced in the pupil's reversal response of *cube-cub* for *cub-cube*. Both error responses tend to support the former hypothesis for, if there had been exposure to polysyllabic vocabulary words, the pupil's auditory feedback mechanism would have effected self-correction of the responses.
And finally, there is embedded in one of the error responses, 'subsituation' for 'substitution,' another example of a reversal tendency. Although the two examples are different types of reversals, the first (*cube-cub* for *cub-cube*) is a word order reversal while the second ('subsituation' for 'substitution') is a letter sequence reversal, they may represent vestigial effects of a previous visual perceptual disorder. Therefore, personalized instructional treatment content should include taxonomic components from Basic Skill 1—Cognitive-Perceptual, Subskill 3—Directionality-Laterality and Sequential Level 3—Grades 4-6.

The last part of the Diagnostic Test, the graphic reproduction of the alphabet letters in the upper- and lower-case sequences, provides data that are relevant for the selection of taxonomic components in the Subskills of Basic Skill 1—Cognitive-Perceptual and in the sixth division of the Taxonomy, Sensory Modality Input. Significant features of the pupil's reproductions are: the correctness of the sequences, the facility with which the graphemes are reproduced, the organization that is observed in the formation of the letters, the letter substitutions that represent reversals and the uniformity of letter characters, whether print, manuscript or cursive.

In addition, the results of the examination are compared with the results of the other test measurements for the purpose of substantiating previously held hypotheses. Much care is taken in this analysis for it is the staff's belief that before grapheme-phoneme associations can be produced, a stable, retrievable, visual image must be effected for each letter of the alphabet.

Analysis of the model pupil's performance on the section of the Diagnostic Test devoted to the graphic reproduction of the alphabet sequences yields the following dialogue:

Question: Is there strength evident in the pupil's graphic reproduction of the alphabet sequences?
Answer: Yes.

Question: Then, to what degree and extent is the strength apparent?
Answer: To the fullest degree and extent. All aspects of the pupil's performance are perfect, including correctness of sequences, formation of the graphemes, rate of retrieval and homogeneity of letter characters.

Question: Then, are there only patterns of strength available for instructional treatment?
Answer: Yes. There are no evident patterns of deficiency in the pupil's performance.

Question: Then, on the basis of the pupil's past record and performances on other testing measurements, is the execution of this section of the Diagnostic of expected quality and suitability?

Answer: Yes. There is no deviation in performance, although some slight evidence of visual perceptual difficulty had been anticipated.

The final step of the project's evaluation procedure is the administration of the Dolch Two-Hundred and Twenty Most Frequently Used Words Test. Depending on the kind of data being sought, the test can be administered in either one or two ways: in a group setting or an individual evaluation setting.

As a group instrument, the test assesses the process of recognition; as an individual instrument, it assesses the process of recall. In the hierarchy of mental functions, recognition is considered a lower-ordered cognitive task than recall.

It is the staff's practice to administer the Dolch Test, either in a group or individual setting, only when certain conditions have been met. For example, the test is not given to pupils achieving scores above fourth grade level or below second grade level on the Gates-MacGinitie Vocabulary Test. There are two assumptions on which the above decision is based; the first is that a vocabulary score reflecting fourth grade ability or more is indicative of the pupil's mastery of the Dolch word list; the second is that a lower than second grade vocabulary score is regarded as an indication of the opposite effect.

In the first case, with evidence of mastery, the test would be administered on an individual basis as a task of word recall rather than word recognition because word recognition would be at too low a functional level for the pupil. However, it is not considered practicable in terms of time and effort to administer the test, even on an individual basis, if the quantity of error responses is so meager as to preclude analysis for patterns of error. A pattern of almost absolute strength is relevant only to the selection of taxonomic components for individualized treatment; it offers no information to the decision making process in selecting other instructional treatments.

In the second case, with evidence of no mastery based on the vocabulary score of the Gates-MacGinitie, there is such a superfluity of error responses that analysis for patterns of error usually demonstrates a hit and miss pupil technique which is as noninformative as the pattern of absolute strength. In addition, the pupil's patterns of strength and weakness have usually been determined by analyses of the previously administered test instruments.

Therefore, it is customary to administer the test as a group instrument to pupils scoring between the second and fourth grade levels on the Gates-MacGinitie Vocabulary Test. The test is administered individually only if there is ambiguity in the conclusions that stem from the analyses of the test battery data.

Administered in a group setting, each test stimulus is one of the two-hundred and twenty most frequently used English words presented orally; the task is to circle one of the four choice responses presented visually. These four can be classified along the previously described continuum of key response, near key response, distant response and very distant response. The pupil's choices can be subjected to the same classification system, thus patterns of response choice are demonstrable. When analyzed, these patterns yield information regarding cues used by the pupil in word recognition.

Responses composing the patterns of strength, near strength and weakness are further subsumable as items in the three pupil inventories of known, almost known and unknown from which the content for individualized and personalized instructional treatments is drawn.

In addition, other facets of the pupil's performance are observable: the ability to keep apace with the rate of test item presentation, the ability to attend to the assigned task and inhibit distracting stimuli, the ability of the eye to track across the horizontal plane of four choice responses and make the diagonal sweep to the next test item, the absence or presence of a perseverating tendency to mark responses in one column regardless of the presented test stimulus and the ability to understand the task requirement and retain that understanding for the duration of the testing situation.

This type of data has significance for both parts of the instructional treatment, i.e., the content and the means of transmitting the content. For example, a high degree of pupil distraction to extraneous stimuli would suggest an Instructional Setting (the fourth taxonomic component) that would minimize distractive behavior, probably the isolation of the second Instructional Setting—Student Self-Instruction. If a pupil is able to differentiate the differences and likenesses in the pure auditory tasks of the Wepman but cannot make the aural-visual associations required by the Dolch Test items, then in all likelihood the decision pertaining to the selection of Sensory Modality Input (the sixth taxonomic component) would be to reserve the bimodal sensory input of Auditory-Visual for personalization and to utilize a single modal sensory input (the nature of which would be determined by data from other sources) for individualization.

The course of action followed throughout this chapter has been to demonstrate the project's system of analysis with the model pupil's score and performance on each test instrument. At this point, the pupil's Dolch Test results should be subjected to interpretation using the question series previously described.

The model pupil scores at a fifth grade, nine month level on the Gates-MacGinitie Vocabulary Test. Since the cut-off point for administering the Dolch Test to pupils of the target population is a fourth grade score at the upper end of the range, the pupil is not measured with the Dolch. Thus, an analysis of the model pupil's Dolch Test results is not available, but exemplifications of this analysis are described in the case histories of Chapter IV.

In the course of describing and elucidating the inner workings of the Taxonomic Instruction Project, certain theoretical points, objectives and practices are emphasized. On the theoretical level, there is a statement of the hypotheses central to the project: the first proposes the entity of a preferential wavelength by which information can be most efficaciously transmitted to and received by the pupil; the second hypothesizes a positive correlation between pupil engagement and pupil academic achievement; the third advances the premise that any increase in teacher effectiveness will be in direct proportion to the number of taxonomic strategies utilized.

In addition, the theoretical focus centers on the Taxonomy as a multifaceted instrument that is to be viewed by the teacher as an inventory of behavioral options for the selection of content and strategies to match pupil-learning needs, an instrument for diagnosing the strengths, near strengths and deficiencies of pupil-learning styles, an experimental instrument to determine the pupil's preferential wavelength and an operational instrument whereby effectiveness of instructional treatment can be facilitated.

Within this theoretical structure, two basic instructional prescriptions are differentiated, individualization and personalization of instructional treatment, the former emanating from the pupil's inventory of strengths, the latter from the pupil's inventories of almost strengths and weaknesses. The four-stage diagnostic process from which evolve treatments of individualization, personalization and combinations thereof is described.

On the practical level, the central focus is on demonstrating the multiple uses of the Taxonomy. The account describes the project's test battery, the types of data accumulated

from the testing situations, the investigatory systems used in the analysis and interpretation of pupil scores and test performances and the relevance of the results of analysis and interpretation to the decision making process in selecting taxonomic components for instructional treatment. In order to facilitate an understanding of the taxonomic procedure, the scores and performances of a pupil in the target population are used for demonstration purposes. Essentially, the emphasis of the account is on the selection of items within the first three divisions of the Taxonomy. However, in the next section of this chapter, there is a shift in focus to the taxonomic processes involved in the selection of the items within the last four divisions of the Taxonomy which constitute the means for the transmission and reception of the content.

The ultimate objective of the project is to effect optimal pupil engagement with a broad scope of reading content in a wide variety of learning situations, utilizing the different channels of sensory input and output as delineated in the Taxonomy. In the process of achieving the ultimate objective, a number of other objectives are anticipated: designation of a preferential wavelength for the pupil, enhancement of pupil self-image through the use of individualized instructional treatment, desensitization of the pupil to his own vulnerabilities by personalized instructional treatment, development of teacher awareness of different styles of instruction and learning and the basic components of each, enhancement of the teacher's instructional role to include diagnosis of pupil's test scores and performances as related to decision making in the selection of instructional treatment components and facilitation in controlling pupil classroom behavior, and finally, generalization of positively modified pupil behavior to situations outside of the school.

*SECTION 2*

Within the context of the Taxonomic Instruction Project, the instructional act is viewed as a two-party act in which the transmission and reception of Basic Skills and content is the primary objective. This description represents a deliberate effort to present a simplistic view of the instructional act and a narrow picture of the teacher's role. The purpose of such an effort is to provide a point of departure for initiating a broadly based discourse on the evolution of strategies which are composed of an item from each of the last four taxonomic divisions (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output) which, when paired with prescriptions for content (Basic Skill, Subskill and Sequential Level), form the taxonomic entity referred to as instructional treatment.

A complete view of the teacher's role is seen to constitute three functions in addition to the transmission of Basic Skills and content to the pupil. Teaching takes place within a social setting, i.e., the pupil must interact with his teacher and other members of the class. Therefore, it is the teacher's reponsibility to engineer the social elements of the classroom in order to facilitate the development of healthy relationships, i.e., the status relationship between himself and the pupil, friendships among pupil peers and leadership roles for some pupils which do not diminish ego support for all pupils.

Operating in conjunction with this function, the teacher must design learning situations. In this role, he first elicits, then stimulates and habituates the pupil's use of many cognitive processes, i.e., convergent thinking, classification skills, divergent thinking, reconstruction and inferential skills.

In combination with the three functions of the teacher, i.e., the transmitter of Basic Skills and information, the engineer of the social environment, and the elicitor of cognitive processes, the teacher must manage the reinforcement systems in which learning principles and reward systems are used in order to shape pupil behaviors.

This delineation of the teacher's functional field into four units does not suggest that these units are practiced separately. To the contrary, in actuality they overlap, intersect and interact to such an extent as to be virtually inseparable. However, awareness of the composition of the teaching act and competency in each of the compositional units makes it possible for the teacher to be an effective agent in dealing with the complexities of the total teaching process.

Taxonomic instruction is addressed to developing the competence of the teacher in one segment of the teaching conglomerate, i.e., the transmission of Basic Skills and information. In order to do this, the teacher needs to be conscious of two sets of variables, the one which composes his instructional style as well as the one that constitutes the pupil's learning style. The two are idiosyncratic and, therefore, not necessarily compatible.

Previously, the Taxonomy was described as an inventory of behavioral options available to the teacher in meeting the pupil's learning needs and as an instrument of diagnosis and evaluation to remediate the pupil's learning deficiencies in terms of Basic Skills, Subskills and Sequential Levels. Now the Taxonomy is to be viewed by the teacher as a dualistic instrument for the purpose of analyzing his own instructional style as compared to the pupil's learning style, thereby providing the mechanism for adjusting the compatibility of the two. The variables of concern at this point of the discourse are those represented by the last four divisions of the Taxonomy.

Traditionally, the teacher is regarded as the transmitter while the pupil is cast in the role of the receiver. To a large extent, this assignment of roles is justifiable. However, this view suggests a system that denies the flexibility of roles that is inherent in any act of

communication. With this denial, communication becomes a unidirectional flow of information which precludes any interaction or feedback.

Pupil feedback is replete with both obvious and less obvious signs of the pupil's reactions to the content of the message and the means by which the content is transmitted. Feedback in totality can indicate the pupil's attitude toward all learning, his value of a specific learning situation with its attendant message, his cognitive ability to handle certain intellective processes, the affective components of the message and the transmission, the integrity of the physiological system that must cope with the various sensory modalities of the learning task, the unity of the psychological organization with which the pupil confronts the varying segments of the school world, the signs of pathology in physiological and psychological development that may be manifest in the pupil's performance and the suitability of the pupil's behaviors in terms of the different environments that compose his world. Information of this kind is available to anyone placed in the role of the receiver. Therefore, within the framework of the Taxonomic Instruction Project, the teacher is to view himself as a receiver of information as well as a transmitter, tailoring his styles of instruction to the pupil's styles of learning as observed in many instructional situations and delineated by other sources of data.

The observation and annotation of pupil behavior for the purpose of accumulating data relevant to the decision making process in the selection of taxonomic components for the transmission of instructional content (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output) is a time-consuming process. To complete this process before initiating instructional prescriptions for pupil treatment would be both to compound incongruities of teacher-pupil styles and to waste the limited amount of time available for pupil instruction. It is suggested that there are levels at which taxonomic decision making can proceed from a point where the bases for decisions are a few observations of a limited scope of the pupil's learning behaviors, to the ultimate level of decision making which is based on a gestalten view of behavior and is inclusive of the attitudinal, cognitive, affective, emotional, psychological, psysiological and pathological aspects of the pupil's learning style.

Whatever a pupil expresses, either verbally or non-verbally, is an outcome of all that he has learned previously. The pupil's responses and behavior on the test instruments are analyzed by means of evocative questions primarily for the purpose of specifying the known, nearly known and unknown of the pupil's academic development, even though other aspects of development are perceived in the process. In the same way, the observed behaviors of the pupil within the classroom and school compose a reservoir of data that yields, upon analysis, inventories of the strengths, near strengths and deficiencies of the pupil's nonacademic development.

Whereas individualization of instructional *content* is initiated from a base of the pupil's inventory of the known and as personalization *content* is drawn from inventories of the pupil's nearly known and unknown, so individualization and personalization of instructional *strategy* are prescribed from their respective inventories of nonacademic strengths, near strengths and deficiencies. Prescriptions for the individualization and personalization of content are written in the verbal or number code systems of the first three divisions of the Taxonomy (Basic Skill, Subskill and Sequential Level), while prescriptions for the individualization and personalization of instructional strategies are expressed in terms of the verbal or number code systems of the last four divisions of the Taxonomy (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output).

Consequently, the search for a pupil's preferential wavelength continues with decision making addressed to spheres of concern related to nonacademic learning behavior. Thus, a

pupil's instructional treatment is a transmission medium for the amelioration of both types of behavior, academic and nonacademic. When amelioration is directed toward academic behavior, the segment of instructional treatment involved is content or the first three taxonomic divisions (Basic Skills, Subskills and Sequential Levels); when amelioration is directed toward nonacademic behavior, instructional treatment involves the last four taxonomic divisions (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output) which constitute the strategies by which means instructional content and skills are transmitted for pupil reception.

Though the central issue of the project is the instructional act, the basic components of which are the teacher's instructional style and the pupil's academic learning development, project effort is consequent to the accumulation of data referring to the nonacademic aspects of pupil-learning behavior and the insights developed from that data.

Engagement is defined as the pupil's ability to attend to an instructional task based on the seven taxonomic components of pupil-learning behavior. The degree of pupil engagement can be assessed and specified as an Index of Engagement by recording the pupil's behavior on the project's observation instrument as he performs an instructional task (see Appendix C). The units of observation are recorded every two minutes; the ratio of recorded units of pupil engagement to the total units of possible pupil engagement forms the Index of Engagement.

For instance, an instructional treatment of the following dimensions is designed for a fifth grade pupil: Basic Skill 1—Cognitive-Perceptual; Basic Subskill 2—Memory Span; Sequential Level 1—Grades 2 and Below; Instructional Setting 5—Teacher-Small Group; Instructional Mode 4—Test Response; Sensory Modality Input 4—Visual; Sensory Modality Output 5—Vocal-Motoric in which the motoric response is required before the vocal. Translated into classroom terms and materials, the teacher is flashing sight vocabulary word cards at a time interval of five seconds to a small group of pupils whose task is to graphically reproduce the flashed word upon the withdrawal of the stimulus. The teacher then calls upon a pupil to read the sequence of letters in his answer and, if possible, to recall the word.

It is to be assumed that the treatment has been selected for the purpose of effecting behavioral modifications in each of the pupils in the group. It is not to be assumed that the same behavioral change is planned for all the pupils. On the contrary, although the same instructional treatment may be selected for a group of pupils, the selection may be based on a different set of criteria and the teacher may have different objectives and outcomes in mind for each pupil.

For Pupil J, the decision to select these particular taxonomic components of treatment may be based on evidence that he has an inadequate visual memory span. In J's case, all other taxonomic components of the treatment may be drawn from his reservoirs of known content and nonacademic strength. Therefore, the treatment mix may be two parts personalization to five parts individualization, the former occurring in the taxonomic divisions of Subskill and Sensory Modality Input coded within the divisions as numbers 2 and 4 respectively, and the latter applying to all other divisions of the taxonomic treatment.

However, for Pupil K, the basis for selecting this instructional treatment may proceed from other evidential sources. In K's case, the focus of interest may be on language development. This pupil has demonstrated a large differential between his oral and written language outputs with the former prevailing over the latter in both quantity and quality. Thus, this treatment for K is one part personalization to six parts individualization with individualization being used in all components of the treatment with the exception of Sensory Modality Output which in this treatment is Vocal-Motoric Response (5).

For a third pupil, Pupil A, the basis for the emphases of treatment may stem from data

indicating a poor self-image and inadequate social control. It is known that A can handle the academic components of the treatment with facility (Basic Skill 1—Cognitive-Perceptual, Basic Subskill 2—Memory Span, Sequential Level 1—Grades 2 and Below). All the other taxonomic components of the treatment, with the exception of Instructional Setting, are also drawn from Pupil A's strengths. Thus, treatment is designed to provide A with an instructional situation in which he can perceive himself as a "good" performer.

Development of Pupil A's social control is the other focus of the instructional treatment. Previous instructional treatments have yielded evidence of Pupil A's progress in the social setting of the classroom. Pupil A has performed well in the first four items of the fourth division of the Taxonomy (Instructional Setting): Instructional Setting 1—Teacher-Student which is analagous to the mother-child dependency relationship of early childhood development; Instructional Setting 2—Student Self-Instruction which is regarded as being comparable to the period of development in which the child interacts predominantly with his physical world; Instructional Setting 3—Student-Student (Parallel) which is likened to the stage of development in which the child, side-by-side with another child, is capable of interacting with the environment but not with his companion; Instructional Setting 4—Student-Student (Interactive) which is viewed as the same Setting as 3 with the additional dimension that the child has developed sufficiently to interact with both the physical and social components of the Setting.

Pupil A is ready to enter Instructional Setting 5—Teacher-Small Group wherein the pupil will be required to meet the social demands of more than one peer. Thus, personalization of instructional treatment for Pupil A is in the domain of social behavior. Pupil A's ability to control himself within this Setting will be evaluated by means of the project's observational procedure which has been described previously. The future course of instructional treatment for all the pupils of this groups is dependent on the Index of Engagement that is obtained by observing and tracking each pupil's behavior while interacting with the instructional treatment.

Inasmuch as the prescriptions for instructional treatment are contained within the matrix of the pupil's total development, it is necessary to accumulate data from many sources and to interpret them from many frames of reference. However, it is not necessary to await the completion of data collection before initiating the decision making process for the purpose of designing instructional strategies.

The decision making process consists of five levels of both interpretation and evaluation, each succeeding level having an expanded reservoir of data, analyses, decisions, treatment formulae and evaluations. The level at which the process of decision making originates is dependent upon the quantity and quality of information contained in the pupil's cumulative record from the referral school and the quality and quantity of data collected by the teacher, project staff members and other professionals at the present school site.

**Decision Making Process—First Level**

At this level, there are four aspects of the pupil's behavior that form the basis for the decision making process. Two of the four, self-containment and social control, represent the maturity of the pupil's ego growth and social development. Self-containment is seen as a function of ego growth; it is considered to be lower developmentally than social control which proceeds from the process of socialization of self-containment. Self-containment develops through the interaction of the self with one's physical environment, elements of which are manipulative to a certain degree by even a small child. On the other hand, a social

setting requires interaction with peers or authority figures, elicits a different set of behavioral mechanisms and is less manipulative than a setting of self-containment.

The other two behavioral aspects central to the project's decision making process at this level, language development and cognitive patterns, are indicative of the operational level of the pupil's academic capacity but to no degree suggest his academic potential.

Some data, relevant to these four aspects of pupil behavior, may be found in the past records of the pupil. The rest of the data is to be sought in staff observations of pupil behavior during the reading period; teacher observations of pupil behavior, both academic and nonacademic, during other periods within the classroom; in other school settings such as assembly and gym; in the diagnoses of the project's test instruments; in the intuitive feelings of both the teacher and the staff members; and in the information that is furnished by the social worker, psychologist and psychiatrist of the school.

Section 1 of Chapter III contains a detailed description of the diagnoses that evolve from analyses of test scores and pupil test responses. Even with this type of data, it is apparent that certain speculations regarding pupil self-containment, social control, language development and cognitive patterns can be generated. However, more profound decisions are possible on the basis of the data from other sources. The questioning procedure which also is described in Section 1 of the Chapter is applicable to the data on pupil self-containment and social control as well.

Following is the questioning procedure as it evolved from an analysis of the data on Pupil J at the beginning of the 1969-1970 school year. Counterparts of the question and answer dialogue can be imagined for other pupils having different behavioral characteristics.

Question: Are there observational data to indicate that Pupil J has sufficient control over his reflexes to give the necessary concentration to tasks in the social setting of the classroom?

Answer: No. To the contrary, observations of Pupil J suggest an inadequacy of reflex control over concentration.

Question: Then, what is the degree and extent of Pupil J's inability to restrain himself?

Answer: The disability pervades Pupil J's behavior and is evident to the same degree in both academic and nonacademic tasks; it is observable in all the settings that compose the school environment, e.g., movement through the halls, in the lunchroom, during recess and in the morning milk and cookie period.

Question: Then, what are Pupil J's behavioral manifestations of this disability?

Answer: Pupil J's inability to sit at the desk, to inhibit irrelevant stimuli, to attend to content presented either visually or aurally, to inhibit oral responses to situations that are not self-applicable and to accept criticism from another person, either peer or adult.

Question: Are these behavioral manifestations of Pupil J's lack of self-containment to be expected?

Answer: Yes. Pupil J's cumulative record is replete with anecdotes attesting to the presence of these behavioral symptoms throughout his first five years of school. The manifestations are no more observable in this school than they were in the previous one Pupil J attended. In fact, there seems to be a slight increase of instances of containable behavior on his part.

Question: Then, to what condition can this increase be attributed?
Answer: To the small classroom register which enables the teacher to address more attention to Pupil J than a classroom teacher with a regular register would be able to do.

Question: Is there any facet of Pupil J's behavior that is suitable to the requirements of the school regimen?
Answer: Yes. Pupil J's records of attendance and punctuality are nearly perfect. Absences are always due to illnesses. Although his professed desires to learn to read may be held suspect, the attendance and punctuality records tend to substantiate an elevated motivational factor.

Question: Are there any conditions which seem to effect a heightened suitability of Pupil J's behavior?
Answer: Yes. During the inclement weather of winter when he is one in a small group of pupils attending class, there is a positive change noticeable in the pupil's capacity for self-containment. On these occasions, the distraction level of the class is minimal and the amount of effort the teacher can exert with each pupil is maximized.

Question: Then, with reference to these observational data, can a definitive statement be made regarding Pupil J's level of socialization?
Answer: Yes. The consensus is that Pupil J's mechanisms for self-containment are inadequate and, therefore, the social setting of the classroom exacerbates the impulsivity of his actions. On a developmental scale, Pupil J is perceived as functioning effectively at only the primitive mother-child level of socialization. Thus, this level of social development is to be included in Pupil J's inventory of strengths, while all other levels become items in the inventory of his social deficiencies. As yet, there are insufficient data to allocate behavioral patterns to an inventory of social near strengths.

Question: Then, what implications do these diagnostic statements have for the decision making process in selecting the taxonomic components that pertain to the teacher's transmission and the pupil's reception of message content?
Answer: Behaviors, reflective of self-containment and social control levels of development, are germane to the selection of treatment components from the fourth division of the Taxonomy, Instructional Setting. Item 1 -Teacher-Student is believed to be analagous in the school to the mother-child relationship in the home. Since the consensus is that the mother-child relationship represents the strength of Pupil J's level of socialization, Item 1—Teacher-Student is seen as a possible component of his preferential wavelength and is to be selected as a component for the individualization of instructional treatment. Observations, analyses of the observations and indices of Pupil J's engagement in this Instructional Setting will indicate whether the Teacher-Student grouping is in fact representative of his preferential wavelength and social strength.

Question: Suppose the data confirm Instructional Setting 1—Teacher-Student as a component of Pupil J's preferential wavelength, for how long a period of

time then is he to be exposed to this one Instructional Setting of Teacher-Student?

Answer: No definite time allotment can be projected. The time factor varies for each child. Movement beyond a Setting of individualized instructional treatment is dependent on the frequency with which pupil behavior can be characterized as unexpected and suitable. When the reservoir of successful pupil experiences yields evidence of a concomitant heightening of pupil self-image, this is the point at which to initiate personalization of instructional treatment by selecting an Instructional Setting that is slightly more challenging in its demands on the pupil's self-containment and social control mechanisms.

Question: Assuming that Pupil J has demonstrated behavior so frequently unexpected and suitable that it can now be characterized as expected-suitable and that a reservoir of successful learning experiences has resulted in an enhancement of his self-image, then what is the next instructional placement setting for the pupil?

Answer: The decision to personalize instructional treatment would be carried out by placing Pupil J in Instructional Setting 2—Student Self-Instruction which is comparable to the developmental level at which the child interacts with the environment without the intervention of the mother as well as being beyond the level of self-containment demonstrated by Pupil J at the present time.

Question: Then, should Instructional Setting 2—Student Self-Instruction constitute the only grouping for instructional treatment?

Answer: Yes. It is the only Setting for personalization of instructional treatment. However, full treatment should consist of an alternation of exposures between the individualized Setting, which in pupil J's case is Teacher-Student, and the personalized Setting which is Student Self-Instruction, with the larger dosage being the individualized Setting.

Question: Then, what behaviors are likely to be evoked in Pupil J by personalizing the Instructional Setting?

Answer: It is anticipated that personalized Instructional Setting 2—Student Self-Instruction will precipitate the regressive patterns of expected-unsuitable behavior.

Question: Then, how long a period of time will Pupil J demonstrate this behavior?

Answer: Again, the time factor cannot be projected definitively. However, continued exposure to the personalized Instructional Setting should effect a decrement in the frequency of regressive behavioral pattern occurrence until there are few or no instances of such behavior. At this point in the course of treatment, Pupil J should be demonstrating strength in the behavioral patterns of self-containment and social control imposed by Instructional Setting 2—Student Self-Instruction. Thus, the number of Instructional Settings available in his inventory of strengths for the individualization of treatment has increased to two, Instructional Settings 1—Teacher-Student and 2—Student Self-Instruction. The personalized form of treatment in the

domain of Instructional Setting is continued with Instructional Setting 3—Student-Student (Parallel).

Question: Suppose that the data collected from the observations of Pupil J performing in Instructional Setting 1—Teacher-Student do not confirm this Setting as a component of his preferential wavelength and, in terms of engagement, the Index of Engagement in Setting 1 is poor, is there an alternative selection that can be made?

Answer: Since Instructional Setting 1—Teacher-Student is the taxonomic option at the most primitive level of social development, there is no other Instructional Setting available as an alternative.

Question: Then how can the plan to provide Pupil J with a body of successful learning experiences be realized?

Answer: By manipulating the nontaxonomic variables of the treatment's Teacher-Student Instructional Setting, it is possible to intensify the signal or the degree of preference of Pupil J's wavelength. For example, since his self-containment behavior patterns are characterized by a deficiency in the inhibitory mechanisms that exclude the reception of irrelevant stimuli and thereby set up interference with his ability to attend to relevant stimuli, the use of a headset and placement in an isolation booth can be considered aids to effect a reduction in Pupil J's reception of irrelevant stimuli.

Question: Should these nontaxonomic decisions prove ineffective, is there another option available?

Answer: The possibility of replacing the teacher of the Teacher-Student Instructional Setting with a tutorial surrogate for the purpose of withdrawing Pupil J from the environmental stimuli of the classroom should be explored. In a sense, the decision to take such a step would effect an extreme extension of the option to use an isolation booth in the classroom.

Thus, Instructional Setting 1—Teacher-Student, or a variation thereof, is the first decision evolving from an analysis of the data that is made in selecting the taxonomic components of the strategy segment of Pupil J's individualized instructional treatment. The effectiveness of this decision in providing him with a preferential Instructional Setting that will enhance his self-containment behavior patterns remains to be evaluated by means of the project's observational procedures. The delineation of these procedures is to be preceded by a description of the decision making process as it applies to the selection of the three remaining taxonomic components that compose the strategy segment of instructional treatment for Pupil J: Instructional Mode, Sensory Modality Input and Sensory Modality Output.

Levels of self-containment and social control development affect not only the pupil's interactional behavioral patterns in the social setting but also exert force on the pupil's ability to attend to the style in which the content of the instructional treatment is presented.

The Instructional Mode category of the Taxonomy offers a progression of styles with which content can be presented which is hierarchically ordered ascendingly in accordance with the self-containment and social control demands evoked by the nature of each style. The primitive level of Pupil J's self-containment and social control behaviors restricts the

selection of style in the Instructional Mode category to those that minimize the self-containment and social control demands made on him. Chapter II offers the nine taxonomic options of Instructional Mode that are available to the teacher. The listing suggests a hierarchy in which the social requirements at each level become increasingly more demanding and are followed by a rationale for the placement of each style in the sequence.

Having observed Pupil J's behavior in the classroom, it is now possible, by means of the hierarchically ordered style options, to select one that will match his capacity for self-containment and social control and will foster his engagement in the academic tasks prescribed for him. The option selected is effected by applying the question and answer procedure to the data that characterizes Pupil J's social development.

Question: What are the guidelines that should be used in selecting an Instructional Mode option?
Answer: The data on self-containment and social control.

Question: Does the data provide evidence of strength in these two areas of social development?
Answer: Yes.

Question: Then, to what degree and extent?
Answer: Observations during the test taking period indicate that Pupil J can contain himself and perform a task more adequately as the number of peer interactions in the social setting is decreased. For example, Pupil J was highly distracted when given the Gates-MacGinitie Reading Test, a group-administered testing instrument. His ability to attend to the task increased markedly during the Wepman Test of Auditory Discrimination, an individually administered instrument.

Question: Then, is a limited number of social contacts the only criterion to be used in selecting the Instructional Mode option?
Answer: No. There was a breakdown in Pupil J's self-containment behavior during the individually administered Diagnostic Test which can be attributed to the high degree of frustration generated within him by the test.

Question: Isn't the frustration level a function of the content of the message and the Sequential Level at which the content is presented?
Answer: Yes. But Instructional Mode, to a lesser extent, also controls the frustration level and, therefore, should be considered a criterion in the selection of the option.

Question: Then, which are the options in Instructional Mode that provide a minimal amount of social peer interaction?
Answer: Options 1 (Play-Puzzle), 4 (Test-Response), 6 (Exploration), 7 (Programmed Response) and 8 (Problem Solving).

Question: Then, which of these items would generate the least amount of frustration in Pupil J?
Answer: Options 1 (Play-Puzzle), 4 (Test-Response) and 7 (Programmed Response) are Instructional Modes that can be structured so that the goals are clearly

defined and the demands on the child's inner resources are not too great.

Question: Then, of the three options, which one would be the primary choice?
Answer: Option 1 (Play-Puzzle) which can be designed to bear little resemblance to the traditional academic tasks at which Pupil J has failed repeatedly.

Question: Then, options 4 (Test-Response) and 7 (Programmed Response) are to be reserved as alternatives if option 1 (Play-Puzzle), upon observation, proves not to be a component of Pupil J's preferential wavelength?
Answer: Yes. Or if Play-Puzzle is effective in generating self-containment behavior and engagement in Pupil J, options 4 (Test-Response) and 7 (Programmed Response) can be used to initiate personalization of instructional treatment.

Two taxonomic components of the strategy segment of instructional treatment have thus far been selected for Pupil J, Instructional Setting 1—Teacher-Student and Instructional Mode 1—Play-Puzzle. Adjustments in the selections are contingent on the evaluation of the data that are accumulated in the course of observing Pupil J in the classroom. The teacher and the project staff anticipate that Instructional Setting 1—Teacher-Student and Instructional Setting 1—Play-Puzzle will evoke within Pupil J unexpected self-containment behavior patterns that will be suitable for facilitating cognitive and social development.

The next decision to be made is in the Sensory Modality Input category of the Taxonomy. The seven options in this category are hierarchically ordered in accordance with the staff's concept of children's physiological development, with particular reference to the sensory systems of reception. Therefore, the question and answer procedure utilizes the data that provides evidence of strengths and deficiencies in Pupil J's sensory channels of reception.

Although the project's test battery does not include instruments designed specifically to assess the capacity of the three primary sensory channels, visual, auditory and kinesthetic, within which the haptic and tactile modalities are included, it was mentioned in Section 1 of this Chapter that the pupil's performance on the project's tests which are designed principally to measure reading ability in comprehension and word recognition, auditory discrimination, diagnosis of phonic elements and sight word vocabulary storage also yields a fund of information that is relevant to assessing the development of a child's sensory modalities. Using this data, the question and answer procedure for selecting a Sensory Modality Input option for Pupil J proceeds as follows:

Question: Is there evidence of strength in Pupil J's visual and auditory channels of reception?
Answer: Yes.

Question: Then, to what degree and extent?
Answer: The degree is low. There is evidence in both channels of more deficiencies than strengths, the strengths not seeming to be used in formal academic tasks.

Question: What is the nature of strength in the visual channel?
Answer: Pupil J can reproduce graphically some letters of the alphabet.

Question: Then, what is the nature of the deficiency in the visual channel?
Answer: Pupil J's visual perceptual constancy is poor; there is much evidence of rotation along the vertical and horizontal axes in his reproduction of both the upper- and lower-case letters of the alphabet with the preponderance of errors in the latter. In addition, on three of the tests, Pupil J wrote his name with the letters in an improper sequence.

Question: Then, is this disability regarded as a purely receptive one?
Answer: There is not enough data to answer this question as yet.

Question: What is the nature of the strength of the auditory channel?
Answer: Pupil J's performance on the Diagnostic Test indicates that he can name and sound some of the letters of the alphabet. Furthermore, the Wepman provides evidence that Pupil J can make some fine speech discriminations of consonants in the final position and vowels in the medial position.

Question: Then, what is the nature of the deficiency in the auditory channel?
Answer: The data from the Wepman suggests that Pupil J has difficulty in discriminating aurally phonemically similar consonantal sounds, particularly in the final position. In addition, the Diagnostic Test data indicates inadequate aural perception of isolated letter names and sounds.

Question: Then, does there seem to be a relationship between the visual and aural aspects of the perceptual disability?
Answer: Yes. Many of the isolated letters that Pupil J names and sounds inappropriately are the same letters that he reverses in reproducing.

Question: Then, could the data indicate a perceptual disability that is primarily visual?
Answer: No. The test items on the Wepman are purely auditory stimuli; Pupil J's performance demonstrates inadequate aural discrimination of many fine speech sounds. The pupil's poor performance may merely reflect a phenomenon of his cultural placement.

Question: Then, is there a differential in the functional capacity of the two channels?
Answer: Yes. At the moment, Pupil J's auditory channel seems to be more intact than his visual, although both systems are evaluated at below normal development.

Question: Then, what decision is to be made in choosing a Sensory Modality Input option as the third component of the strategy segment of instructional treatment for Pupil J?
Answer: Since there are data to suggest that Pupil J's primary sensory systems are inadequate and possibly too unstable for the reception of information in the classroom setting, the decision is made to select Sensory Modality Input option 1—Kinesthetic. Pupil J is a physically active child; thus, his hyperactivity, when channeled properly, can be utilized for the reception of information and the development of self-containment. For Pupil J, individualization of instructional treatment seems more feasible using the Kinesthetic Input system because it summons less self-containment effort on the part of the child.

Question: Then, is there an alternative for option 1—Kinesthetic if, upon observation, it should prove to be inadequate in effecting engagement and unexpected-suitable behavior?

Answer: Yes. The alternate option is 3—Auditory-Kinesthetic which retains the element of body movement and adds a bimodal component of aural stimulation. Option 2—Auditory is bypassed for the time being because this unimodality may overload Pupil J's capacity for self-containment.

The strategy portion of the instructional treatment to be prescribed for Pupil J now consists of the following dimensions: Instructional Setting 1—Teacher-Student with no taxonomic alternative but some nontaxonomic modifications, Instructional Mode 1—Play-Puzzle with the taxonomic alternative of 4—Test Response and Sensory Modality Input 1—Kinesthetic with the taxonomic alternative of 3—Auditory-Kinesthetic. The last taxonomic component of the strategy, Sensory Modality Output, remains to be selected. This component deals with the means by which the pupil expresses himself.

At this stage of instructional treatment, the search is for the expressive channel that will induce the least amount of tension and the greatest degree of engagement and self-containment in the pupil. The data that determines the option to be selected are drawn from test performance and classroom observations as there is no specific instrument in the test battery that measures pupil's preferences in terms of expressive behavior.

The behavioral factors of central interest are patterns of social behavior, particularly self-containment, and the level of the pupil's language development. This division of the Taxonomy, Sensory Modality Output, has five options for the teacher to use in selecting the outlet for pupil response. Although options 2-5 which require an overt response (option 1—No Response requires a covert response) are ordered in a continuity of rising language development, there are concomitant social and self-containment components inherent in each of these responses which need to be evaluated before an option can be selected. For instance, Sensory Modality Output option 4—Motoric Response (written) demands a high degree of self-containment as well as an advanced level of language development, while option 3—Vocal Response can be at a lower order of language development than 4—Motoric Response (written) and contains a social development requirement that is not intrinsic to option 4. The following is the procedure that is used in selecting a Sensory Modality Output option for Pupil J.

Question: Is there evidence of strength in Pupil J's language development?
Answer: Yes.

Question: Then, to what degree and extent is language competency evident?
Answer: Evaluation of language development necessitates the assessment of four kinds of competencies: comprehension of the spoken word, oral communication, written communication and comprehension of the written word. Pupil J's listening ability has been discussed previously. There is general agreement that Pupil J has greater understanding of spoken communication than his behavior indicates. It is not Pupil J's ability to understand but his inability to attend to the spoken word that interferes with comprehension. Pupil J's behavioral patterns of self-containment are too primitive; they create static in the communication system. Pupil J's use of the spoken word, his oral communication, is restricted by a small, concrete vocabulary that is inadequate for his oral expressive needs. In response to questioning,

Pupil J answers in either monosyllables or fragmentary phrases. His extended speech is replete with improper syntax and suggests a severe disability in structuring the events of a situation in the temporal sequence of occurrence.

In certain circumstances, when tense or under pressure, Pupil J's oral communication becomes unintelligible. However, he is adept in the use of gestures, body movement and grimaces to express meaning. At the more advanced levels of communication, in the use and comprehension of the written word, Pupil J has no functional capacity. He reads at a preprimer level and can copy a written communication although he cannot originate one. Nevertheless, it may be possible for Pupil J to handle the lowest level of Motoric Response (written), designating by marks (circling or underlining) a pictorial stimulus from a choice of pictorial stimuli.

Question: Then, in light of this data, which Sensory Modality Output option is to be selected?

Answer: Sensory Modality Output, option 1—No Reponse is rejected as a possible strategy component of the instructional treatment for Pupil J since it provides the least amount of feedback for the teacher.

Motoric Response (gestures) and Vocal Response, options 2 and 3 respectively, seem equally appropriate for Pupil J. Since option 2—Motoric Response (gestures) is regarded as a more primitive stage of language development than option 3—Vocal Response, and since there is considerable evidence that Pupil J is accustomed to using minimal oral responses, the decision is to reserve option 2—Motoric Response (gestures) as the alternative for option 3—Vocal Response. The second alternative to option 3 is option 4—Motoric Response (written) where the response level is limited to circling or underlining the appropriate answer.

With the selection of Sensory Modality Output 3, the strategy for Pupil J's reception of the content is completed. The decision making process has led to a strategy for Pupil J that consists of the following components: Instructional Setting 1—Teacher-Student, Instructional Mode 1—Play-Puzzle, Sensory Modality Input 1—Kinesthetic, Sensory Modality Output 3—Vocal Response. Except in the case of Instructional Setting, there is at least one taxonomic alternative available for each taxonomic option. For the Instructional Setting option—Teacher-Student, there is no taxonomic alternative because the Teacher-Student Instructional Setting is the lowest one in the array of options provided by this taxonomic category. However, some nontaxonomic variables are available with which to modify the selected option of the Teacher-Student Instructional Setting.

The last step in prescribing instructional treatment is to couple the strategy for the pupil's reception of the message with the content of the message. As previously explained in Section 1 of this Chapter, content is based on the first three divisions of the Taxonomy: Division 1—Basic Skill, Division 2—Basic Subskill and Division 3—Sequential Level. Content can be drawn from the three inventories of pupil knowns, pupil nearly knowns and pupil unknowns. When the content is drawn from the inventory of the pupil knowns, instructional treatment is being individualized; when the content is drawn from the two other inventories, then instructional treatment is being personalized.

The course of treatment for any child is to be initiated with individualization of instruction and is to continue at this level until the wounds to the child's self-image from

the years of previous school failure are ameliorated. Since instructional treatment is just being initiated for Pupil J, the content of the message to be transmitted to and received by him will be derived from his inventory of knowns. Data from Pupil J's performance on the four tests included in the battery indicate that the scope of the inventory of knowns is narrow with its skills and content fixated at a preschool developmental level.

Practically all of Pupil J's skills are of a cognitive-perceptual nature. Therefore, the first selected option in the content segment of instructional treatment is Basic Skill 1—Cognitive-Perceptual.

Pupil J's test data, confirmed by the teacher's classroom observations, suggest a degree of strength in naming and sounding some letters of the alphabet which is indicative of the pupil's competence in handling tasks of Symbolic Discrimination—Basic Subskill 1. The nature of the testing instruments does not provide for information regarding the four other options of the Basic Subskills division of the Taxonomy: Memory Span—Basic Subskill 2, Directionality-Laterality—Basic Subskill 3, Time Relationships—Basic Subskill 4, Space Relationships—Basic Subskill 5. Usually this data is derived from observing the pupil and listening to him speak in the course of performing other classroom activities. Since Pupil J exhibits primitive patterns of self-containment and social behaviors, it is assumed that these patterns have limited Pupil J's acquisition of competency in the four Basic Subskills listed above. For these reasons, Basic Subskill 1—Symbolic Discrimination is selected as the second taxonomic component in the content segment of instructional treatment being prescribed for Pupil J.

Sequential Level, the third category of the Taxonomy, is the last decision concerning content that remains to be made. In Pupil J's case, Sequential Level is a simple decision. Previously, he has been described as functioning at a preschool developmental level which limits the selection of option to Sequential Level 1—Grades 2 and Below. Thus, the content segment of Pupil J's instructional treatment is Basic Skill 1—Cognitive-Perceptual, Basic Subskill 1—Symbolic Discrimination and Sequential Level 1—Grades 2 and Below.

When the content of the message is coupled with the strategy (the teacher's methods of transmitting the message in the student's preferential wavelength), the complete instructional treatment is formulated. For Pupil J, the treatment has the following taxonomic dimensions: Basic Skill 1—Cognitive-Perceptual, Basic Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 1—Play-Puzzle, Sensory Modality Input 1—Kinesthetic, Sensory Modality Output 3—Vocal Response. Described in classroom terms and practices, this treatment consists of the teacher working individually with the pupil who is required to respond orally to a set of pupil known alphabet letters which are tactually prominent and obscure from the pupil's view.

Since this treatment draws from the pupil's reservoirs of strength in knowledge and behavior, it is anticipated that the treatment will elicit unexpected-suitable behavior, unexpected in the sense that the pupil is habituated to behavior patterns in the classroom that are expected-unsuitable for learning. Extended exposure to and practice with the treatment should eventuate in the pupil exhibiting behavior patterns yielding measurable residual increments of suitability for learning. With the occurrence of residual increments, the efficacy of the treatment is substantiated and the treatment is then assigned the designation of strategy. The chart below is a reproduction of the observation form on which is recorded Pupil J's initial reactions to the instructional treatment selected for him.

## CLASSROOM OBSERVATION ANALYSIS SHEET

Class *5-1* Teacher *H.S.* Observer *S.G.*

Date *Oct. 2nd.* Period *Reading* Time *9:15* to *9:35*

Taxonomy Pupils Observed *1*

| ITEMS | Basic Skills | Subskills | Seq. Level | Inst. Setting | Inst. Mode | S.M. Input | S.M. Output | | TIME | PUPIL J | | | | | | | | | | | | | | TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | | 2 | 1 | | | | | | | | | | | | | | 2 |
| | | | | | | | | | 4 | 1 | | | | | | | | | | | | | | 4 |
| | | | | | | | | | 6 | 1 | | | | | | | | | | | | | | 6 |
| | | | | | | | | | 8 | 1 | | | | | | | | | | | | | | 8 |
| | | | | | | | | | 10 | 1 | | | | | | | | | | | | | | 10 |
| | | | | | | | | | 12 | N | | | | | | | | | | | | | | 12 |
| | | | | | | | | | 14 | N | | | | | | | | | | | | | | 14 |
| | | | | | | | | | 16 | N | | | | | | | | | | | | | | 16 |
| | | | | | | | | | 18 | N | | | | | | | | | | | | | | 18 |
| | | | | | | | | | 20 | N | | | | | | | | | | | | | | 20 |
| | | | | | | | | | 22 | | | | | | | | | | | | | | | 22 |
| | | | | | | | | | 24 | | | | | | | | | | | | | | | 24 |
| | | | | | | | | | 26 | | | | | | | | | | | | | | | 26 |
| | | | | | | | | | 28 | | | | | | | | | | | | | | | 28 |
| | | | | | | | | | 30 | | | | | | | | | | | | | | | 30 |

*Cognitive-Perceptual* *Symbolic Discrimination* *Grades 2 and Below* *Teacher-Student* *Play-Puzzle* *Kinesthetic* *Vocal*

**Engagement Index (EI) = $\frac{\text{Engagement Time}}{\text{Total Observation Time}}$**

KEY Item # = Engagement
R = Random Behavior
(N?) = Ambiguous Behavior

Circled Item # = Academic Digression
N = Nonengagement
T = Transition between tasks
X = Pupil's Absence

There are five units in which item 1 is recorded: Basic Skill 1—Cognitive-Perceptual, Basic Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 1—Play-Puzzle, Sensory Modality Input 1—Kinesthetic and Sensory Modality Output 3—Vocal Response. Designations of item number indicate pupil engagement in the assigned instructional treatment. There are also five units in which the symbol N is recorded. Notations of N indicate that the pupil is not engaged in the prescribed instructional treatment. The observation period for Pupil J lasted twenty minutes. In tracking the engagement of each pupil in the class, the practice is to scan each pupil every two minutes. Thus, as is noted on Pupil J's observation form, five units of recorded item number indicates an Index of Engagement of fifty per cent for the pupil while the notations of N disclose that an equal percentage of Pupil J's instructional time is spent in nonengagement. The teacher and project staff members raised many questions pertaining to the analysis of Pupil J's observation sheet.

Question: Does the instructional treatment generate unexpected-suitable behavior in Pupil J?

Answer: Yes.

Question: Then, to what degree and extent?

Answer: Pupil J's Index of Engagement is fifty per cent, an unusually high degree of engagement for him. However, the pupil's engagement is exhibited only if the classroom environment meets the exact dimensions of the instructional treatment. When classroom needs require the teacher to absent himself from the prescribed Instructional Setting 1—Teacher-Student, Pupil J is not able to sustain engagement. He becomes a prey to the irrelevant stimuli in the room. Once he disengages, the presence of an authoritative figure is necessary for him to abandon the distraction and redirect his efforts to the assigned task.

Question: Then, since Instructional Setting seems to be the taxonomic component that is most attributive to Pupil J's degree of engagement, is there some alternative to the Teacher-Student option which will enable the teacher to direct more attention to Pupil J?

Answer: It is not realistic to expect the teacher to ignore the needs of other pupils in order to attend to Pupil J. Furthermore, there is no taxonomic option to the Instructional Setting of Teacher-Student since it is the first option offered. It may be possible to assign someone as a teacher surrogate for Pupil J.

Question: Is there anything that distinguishes the stimuli that diverts Pupil J or does everything and anything cause Pupil J to disengage?

Answer: It would appear that auditory stimuli effect disengagement more often than visual stimuli.

Question: Should another taxonomic option replace the selected Sensory Modality Input option of Kinesthetic?

Answer: No. At this point in evaluating the effectiveness of the instructional treatment components, it is premature to discard Sensory Modality Input 1—Kinesthetic as the favored input channel for Pupil J. The effect of

nontaxonomic modification should be investigated first. A headset and placement in an isolated part of the room may inhibit Pupil J's reception of irrelevant stimuli.

The first course of action in modifying Pupil J's instructional treatment was in the application of a headset in an isolated classroom setting. These nontaxonomic modifications effected an immediate increase of fifteen per cent in the Index of Engagement. However, a plateau of engagement of sixty-five per cent was reached at this level. At this point, a graduate student was assigned to Pupil J as a teacher surrogate. This decision immediately produced almost total engagement in Pupil J. Subsequently, Pupil J's degree of engagement leveled off to an index of between eighty-five and ninety per cent. In the course of treatment during the school year, Pupil J's inventory of knowns has expanded both orally and graphically to include the names and sounds of all the consonant letters of the alphabet and approximately thirty-five sight words. Personalization of content has been made possible through these additions in Pupil J's inventory.

There has been a concomitant expansion in Pupil J's inventory of personal strengths. His capacity for self-containment has increased to the extent that he can achieve an Index of Engagement of at least seventy-five per cent with tasks in four Instructional Settings; 1—Teacher-Student, 2—Student Self-Instruction, 3—Student-Student (Parallel) and 4- Student-Student (Interactive). Progress has also been achieved in Pupil J's ability to receive content in a variety of Instructional Modes. Instructional Modes 1—Play-Puzzle and 4- Test Response can be used for individualization of instructional treatment, whereas Instructional Mode 7—Programmed Response can be opted for personalization of instruction only.

In the area of Sensory Modality Input, Pupil J has moved through three options: 1- Kinesthetic, 2—Auditory and 3—Auditory-Kinesthetic. Efforts to effect personalization of instruction with Sensory Modality Input 4—Visual causes a marked decline in Pupil J's Index of Engagement. The initial Sensory Modality Output selected for Pupil J was option 3- Vocal Response. This option plus the two alternative options, 2 and 4—Motoric Response (gestures and movements) and Motoric Response (written—designating the appropriate answer by circling and underlining) respectively, have been used as components in the strategy segment of instructional treatment. However, the data collected from observing Pupil J in the performance of these options are ambiguous and, as yet, provide few cues with regard to Pupil J's favored channel for expression. There seems to be an element of discomfort in Pupil J's use of these options. The intervening factors that may serve to mediate the discomfort have not been discovered.

**Decision Making Process—Second Level**

In due course, the experimental use of taxonomic decisions necessitates the development of an evaluation system in order to assess the effectiveness of the decisions in mediating pupil behavior in the direction of selected outcomes. The process of evaluating taxonomic decisions on the basis of data accumulated from observing the pupil's performance while using the instructional treatment becomes an evolving decision making process unto itself. Thus, from the point of view of the Taxonomic Instruction Project, evaluation and decision making are so intimately linked that decision making follows immediately on the heels of evaluation.

The progression of an evolving instructional treatment proceeds in the following sequence: accumulation of data, evaluation of data, decision making culminating in a seven

digit taxonomic prescription, pupil experimental use of the prescription, observation, accumulation of additional data from observation, evaluation on the basis of new data, decision making culminating, when necessary, in the substitution of taxonomic alternatives for or nontaxonomic modifications of previously selected options, pupil practice with the altered instructional treatment, observation of the practice, accumulation of new data, evaluation of the modified prescription, refinement of decisions, etc.

The process is consummated by the formulation of a strategy which transmits the content of the message in a manner that enhances the pupil's reception of the message. As the pupil moves through the ordered options of each taxonomic category, a reservoir of strategies for prescribing instructional treatment is developed. Thus, the idiosyncratic preferences usually found in the beginning of treatment become part of a much larger repertoire of effective wavelengths.

At the first level of decision making, evaluation is confined both to the criteria of expectancy and suitability and the pupil's Index of Engagement which is derivable from the notations on the observation form. However, as the data bank on the pupil is enlarged, a more refined system of evaluation is required for the purpose of decision making. This is achieved through a coded system which is applicable to the pupil's behavior and which employs the options in each of the last four divisions of the Taxonomy. The ciphers of the code are as follows:

A designates an accustomed behavioral pattern that the child habituates for reasons that are often beyond the child's control such as poor visual and auditory perception, inadequate social development, subcultural mores in conflict with the mores of the predominant culture, poor self-image, neurological impairment, etc. Whenever the accustomed patterns stem from endogenously or exogenously caused deficits in the child's emotional, social, educational and physiological development, there is expected-unsuitable behavior. The accustomed pattern is often the least productive pattern for the child in the sense that it yields little approval from peers and authority figures, generates a poor self-image and interferes with the child's academic and nonacademic growth. Also, it is likely that the accustomed pattern effects a high degree of discomfort in the child.

Pupil J is a child whose level of self-containment is so immature that his accustomed behavior patterns effect a disruption of the learning process.

Pupil T has a bad speech defect; he is unable to express himself in written language. Pupil T's accustomed behavior pattern is to be unresponsive.

Pupil A, an eighth grade nonreader, has inadequate visual and auditory perceptual skills; hence, the Kinesthetic approach (Sensory Modality Input, option 1) would seem to be effective for him. However, the teacher's efforts to initiate this approach have been rejected since Pupil A feels he is being demeaned before his peers.

$A^P$ is a designation of an accustomed-preferred behavior pattern that conforms to one of the patterns required by the options listed in the taxonomic categories of Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output. The initial step in evolving the strategy to enhance pupil reception of the message is a search for the pupil's accustomed-preferred pattern in each of the categories listed above. The word *preferred* in the designation is not meant to suggest that the pupil consciously selects this option, or that the option is ranked as having greater value than others. Instead, the designation of accustomed-preferred represents the taxonomic options that are consonant with the pupil's behavior patterns at this particular stage of his development. The equilibrium between the options and the pupil's behavior patterns are usually manifested by elevated indices of pupil engagement.

The designation is indicative of the pupil's most productive patterns in a restricted

sense only, the restriction being the particular moment in time and pupil development at which the designation is made. One of the central points in taxonomic instruction theory is the need for the pupil to develop behavior patterns that will enable him to function with some degree of adequacy in all of the Instructional Settings with all of the Instructional Modes, Sensory Modality Inputs and Outputs. Only after the pupil has reached this level of development can there be realistic assessments of his most productive behavior patterns.

The factors of comfort and discomfort in the pupil's use of certain patterns of behavior need to be noted and considered in the decision making process. The psychological and physiological development of the pupil determine the comfort or discomfort of a particular behavior pattern. What is comfortable to the physiological system of the pupil may be of discomfort to his psychological system.

Pupil M demonstrates the accustomed-preferred behavior of option 3—Vocal Response in Sensory Modality Output. Treatments that offer Pupil M options 4 or 5—Motoric Response (written) and Vocal-Motoric Response respectively are used for personalization of instruction because these output options generate tensions that are reflected in depressed indices of pupil engagement for M. The data from the observations also indicate that although output option 3—Vocal Response seems to be Pupil M's accustomed-preferred mode of behavior, there is a high degree of discomfort that attends the pupil's use of this option.

**S** is the designation used to indicate a behavioral pattern that has a high degree of stability. For Pupil R, a prescription of the following taxonomic dimensions, Instructional Setting 4—Student-Student (Interactive), Instructional Mode 2—Play-Chance, Sensory Modality Input 2—Auditory, Sensory Modality Output 4—Motoric Response (markings) will, with repeated use, yield expected-suitable behaviors and the closely allied indices of high engagement. The number of such strategies increases and becomes incorporated into the pupil's inventory of strengths as the pupil moves through the options of each taxonomic category.

$S^C$ signifies modes of behavior that are both stable and closed. At the early stages of learning, stable-closed learning behaviors are expected-suitable. However, if the quality of "closedness" is retained indefinitely, the learning behavior becomes too discrete and, therefore, unsuitable for the purpose of generating other learning patterns.

Pupil A perceives the details of what he reads, sees and hears to such an extent that he is unable to comprehend general ideas.

$S^F$ signifies modes of behavior that are both stable and flexible. The stability and flexibility of the pupil's learning systems seem to generate the unexpected but suitable behavioral patterns. In contrast to the $S^C$ quiescent state of learning activity, $S^F$ systems are characterized by dynamic advancements in social and academic development.

Pupil B has learned to reproduce the letters of the alphabet in their sequential order. When asked, for example, which letter follows the letter *f*, Pupil B can retrieve the answer *g* only if he recites the alphabet from *a* to *f*. Such a behavioral pattern is indicative of a stable-closed system of learning. However, if Pupil B were able to respond to the request without resorting to the intermediary step of reciting the alphabet, the learning system would be regarded as stable-flexible.

**T** is the cipher for transition from one form of learning to another. The factors that effect transition are stability and flexibility.

Pupil D demonstrates an excellent aural memory span; he can reproduce orally, in the sequence of presentation, a set of auditory stimuli consisting of either letters or words. In the taxonomic categories of Sensory Modality Input and Output, Pupil D's accustomed-preferred behavior patterns correspond to options 2—Auditory and 3—Vocal Response

respectively. In the course of personalizing instruction for Pupil D, the Sensory Modality Input option 2—Auditory remains constant, whereas the Sensory Modality Output is changed to option 4—Motoric Response (written). This change results in a regression to expected-unsuitable behavior and a depression in the pupil's Index of Engagement.

Apparently, the former treatment produced a stable-closed system of learning that was thrown into disequilibrium by the change in Sensory Modality Output option from 3—Vocal Response to 4—Motoric (written). As Pupil D continues to practice the personalized treatment, there is a gradual diminution of tension and a fluctuation in expected-unsuitable, unexpected-unsuitable, expected-suitable and unexpected-suitable behavior patterns with a rising incidence in the last two patterns and a slowly mounting Index of Engagement. Thus, it is evident that Pupil D is in transition from the accustomed-preferred behavior pattern of Sensory Modality Output, option 3—Vocal Response to the pattern of 4—Motoric Response (written).

E is the cipher that is used to indicate emerging patterns. It is applicable to the above example of Pupil D who is in the process of accommodating himself to the new behavior pattern of Sensory Modality Output, option 4—Motoric Response (written). When the fluctuations in behavior patterns stop and Pupil D's Index of Engagement rises to its former level, the transition process is over; Sensory Modality Output, option 4—Motoric Response (written) has emerged as an additional fully developed accustomed-preferred behavior pattern that is available for Pupil D's use in the learning process.

P is the cipher used by the staff for designating a priority of student needs. For many of the pupils in this target population, there is a multiplicity of needs that requires ordering on the basis of urgency in order to develop a rationale for the decision making process. The pupil's progress through the options in all of the divisions of the Taxonomy effects advancement in his academic and nonacademic development. As the pupil changes, the staff also sets priorities.

Pupil R, an eighth grader, has many needs. Although he is a reader and uses word attack skills with facility, his reading achievement scores have plateaued at a low fifth grade level. Pupil R demonstrates a number of "soft" skills in comprehension, inadequate study skills, poor leadership qualities, inability to handle a mode that requires competitive spirit and an overall reluctance to express himself either orally or in writing. Analysis of the data suggests a common causal factor, i.e., inadequate language development. Thus, personalization of instruction for Pupil R will be initiated with options drawn from the content divisions of the Taxonomy for the purpose of advancing language development. Such options are as follows: Basic Skill 2—Language Analysis, Subskills 4—Word Structure and 5—Syntax; Basic Skill 3—Comprehension, Subskills 4—Word Meaning and 5—Context Inference.

The purpose of the code is to increase specificity in the decision making process. In effect, the application of the code to the data can generate series of specific strategies for the purpose of modifying specific pupil behaviors. Specificity can be heightened further by elongating the code to include an evaluation of the negative and positive aspects of its parts.

For example, Pupil D demonstrates accustomed-preferred ($A^P$) behavioral patterns for Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output. This is a demonstration of Pupil D's strengths, no matter how primitive the behavior patterns are, for it provides positive evidence that Pupil D is functioning at least within the scope of the Taxonomy and that taxonomic practices can be applied to him. This is the positive aspect of the $A^P$ cipher as it is used in designating Pupil D's behavior patterns.

The negative aspect of the $A^P$ designation is a reflection of the length of time it takes the pupil to accommodate to personalized instructional treatment that is designed to effect

movement through the options. In the case of Pupil D, progress through the options, with the exception of Instructional Mode, was somewhat rapid. The data relevant to the effectiveness of personalized treatment that was designed to provide transition from Instructional Mode 4—Test Response to Instructional Mode 5—Role-Playing suggests that Pupil D subconsciously resisted the transition. Ultimately, transition was effected from option 4—Test Response to 7—Programmed Response which had been selected as an alternative option to 5—Role-Playing. Thus, movement was achieved by changing the original decision.

The negative aspect of cipher $A^P$ may therefore function as an indication of an infelicitous selection of option for personalization of treatment or, more broadly, as an indication of inappropriately sequenced options in this taxonomic category. The question of inappropriate sequencing remains to be investigated until sufficient data is accumulated.

Previous mention was made of the negative aspects of the cipher $S^C$ in designating a stable-closed pattern of pupil behavior. However, there is a positive aspect to the designation as well. The significance of the initial use of $S^C$ is that some objective has been gained by the pupil, i.e., something has been learned, some modification of pupil behavior has taken place, and, whether expected or unexpected, the gain or modification is suitable and observable whenever the situation calls for its use. For example, Pupil E has learned fifteen new sight words. He can read these words in isolation or in context no matter how the words are presented, i.e., printed in upper- or lower-case letters, cursively or in manuscript.

The negative quality of the $S^C$ designation arises when the stability of a previous gain inhibits the attainment of another gain. For example, among the fifteen new sight words Pupil E has acquired, there are a few retained with such fixedness that new words with similar configurations are difficult for him to learn. The words *what* and *then* are notable examples of this phenomenon; both of these words have interfered with E's ability to learn new words beginning with *wh* and *th*.

$S^F$, the designation of stable-flexible behavior patterns, also offers a positive and negative view. On the positive side, $S^F$ indicates a modification of pupil behavior that allows for either the incorporation of new information or the transference of information for use in other situations. To use Pupil E as an example again, $S^F$ (stable-flexible) is an appropriate symbol of evaluation for his behavior pattern at the point where it permits transference of his newly acquired skill of recognizing fifteen new words in isolation to recognizing these words in context.

On the other hand, if the degree of flexibility in $S^F$ is too great, there is the possibility that retrieval of older learning patterns will fade as new patterns are acquired. Pupil J has learned to discriminate the short sounds of *a* and *i*. Subsequently, J learns the short sound of *e* and once again attempts to discriminate short *a* and *e*. There is test evidence demonstrating that this newly acquired auditory skill interferes with the former pattern of discriminating short *a* and *i*.

T, the cipher that codes transition from one mode of learning to another and is usually used in a positive sense for transition, indicates pupil advancement developmentally. But, if the transition is prolonged and not consummated by an emerged pattern, then T becomes a negative quantity. In this context, T may signal the need to alter the instructional treatment selected for the pupil in order to facilitate the pattern's growth.

E, denoting emerging patterns, also offers a twofold annotation. E is positive only in so far as the emerging pattern is expected- or unexpected-suitable. If the strategy of the instructional treatment evokes regressive behavior beyond the degree of regression that is anticipated as a result of personalized treatment, then E should be viewed as a negative quantity signaling the need to re-evaluate the strategy. Pupil T can discriminate some

phonemically significant sounds. Instructional treatment is prescribed for the purpose of extending Pupil T's aural discrimination ability to include all such sounds. No unusual learning pattern is noted during Pupil T's first exposure to the personalized treatment. From this point on, however, there is a deterioration in Pupil T's ability to discriminate sounds, even those he was able to discriminate previously; an unexpected-unsuitable pattern is emerging. Therefore, the strategy is analyzed for its weaknesses. The result is a restructuring of the task so that a lower-level competency is demanded of Pupil T.

**Decision Making Process—Third Level**

Although the decision making process at this level bears some correspondence to the processes at the other two levels, there are additional dimensions that heighten the accuracy of the process. The data accumulated for each pupil is examined from four points of interest. The first point focuses on the data for patterns of exigency or crisis that occur in the pupil's performance. For Pupil V, the data yields a diversity of exigency patterns with variations in the frequency at which each type of pattern occurs. Pupil V exhibits a crisis pattern in his attitude toward authority figures, his social development and his motivation to learn.

The primary concern at this point is how to rank the three exigency patterns for priority of instructional treatment. If priority is based on frequency of occurrence, the crisis pattern in motivation should be assigned the cipher P from the coded system because Pupil V has a record of extensive truancy which overshadows the other two patterns of exigency. Actually, however, Pupil V's overtly aggressive classroom behaviors, manifestations of his attitudinal and social exigencies, have greater significance for the teacher than Pupil V's motivational exigency. Pupil V creates no problems for the teacher when he is truant, but his presence in the classroom is the source of crises involving most of the members of the class, including the teacher. From the teacher's standpoint, the motivational exigency would receive the lowest priority, whereas the other patterns of crisis are designated P (priorities). Moreover, an exigency pattern in motivation (truancy) is regarded as a problem for the administrative staff and other school professionals to handle for there is little the Taxonomic Instruction Project can effect for the child who does not attend school.

The second point of interest in the decision making process at this level evolves from the first, i.e., the assignment of priorities to the pupil's patterns of exigency. Once the exigent patterns are identified, effort is directed toward discovering the causes of the exigent behaviors for which taxonomic instructional treatment may be relevant. Identification of causality, then, leads to a period of preconditioning in which strategies are prescribed for the purpose of developing pupil strengths to neutralize the conditions of crisis, thus inhibiting the pupil's patterns of exigency.

To return to Pupil V for the purpose of illustrating preconditioning, Pupil V's attitudinal and social exigencies seem to stem from harsh parental treatment, particularly from the father. His hostility to both peer and authority figures demonstrates the collapse of his faith in people. The cause and effects are identified. Although elimination of the cause is the social worker's province and mitigation of the psychological effects is the functioning of psychiatrists, remediation of effect in academic development is within the scope of the Taxonomic Project. In order to remediate the academically deficient behaviors, it may be necessary to begin with the process of preconditioning other elements of behavior that interfere with pupil learning. The therapeutic value of the project stems from the process of preconditioning.

Viewing the instructional act as occurring primarily within the social context of the

classroom, at what level of preconditioning can instruction for Pupil V be initiated? In his hostility to his teacher and peers, Pupil V constantly severs the channels of communication with these two sources of information. In terms of selecting the taxonomic option of Instructional Setting, what does Pupil V's exigent patterns of hostility mean? The patterns restrict the choice to 2—Student Self-Instruction, for all other options of Instructional Setting demand Pupil V's interaction with the teacher, his peers or the teacher and his peers conjunctively.

Then, what restrictions are incurred by Pupil V's hostility patterns in selecting options of Instructional Mode? The option and its alternatives are confined to those Modes that can be manipulated by Pupil V in a Student Self-Instruction Setting which consequently voids the use of Instructional Modes 3—Play-Competition, 5—Role-Playing and 9—Exposition.

Therefore, the choice of option and alternatives can be drawn from the remaining Modes: 1—Play-Puzzle, 2—Play-Chance, 4—Test-Response, 6—Exploration, 7—Programmed Response and 8—Problem Solving.

Refinement of decision making can be achieved by attending to the degree of self-correction and feedback that are available in each of the options. Within the group of Modes selected for Pupil V, 4—Test-Response, 7—Programmed Response, 8—Problem Solving and 1—Play-Puzzle, in descending order, can be designed to provide V with adequate degrees of these elements. In the opinion of the staff, Mode options 2—Play-Chance and 6—Exploration do not lend themselves to self-correction and feedback design. Consequently, the use of these options for the purpose of preconditioning is canceled.

The same preconditional elements of self-instruction, correction and feedback prevail as determinants in the selection of Sensory Modality Input options. In this taxonomic category, options 2—Auditory, 4—Visual and 6—Auditory-Visual are considered the most viable for the purpose of preconditioning. As for the selection of Sensory Modality Output options, 1—No Response and 4—Motoric Response (written) are regarded as the only choices that conform to the restrictions of preconditioning. The other options, 2—Motoric Response (gestures), 3—Vocal Response and 5—Vocal-Motoric require interaction with another person, a qualification that would contravene the effect of preconditioning.

In effect, preconditioning is comparable to individualization of instruction, the difference between the two being a matter of initial focus. The process that leads to individualization begins with a search for pupil strengths and then moves on to personalization of instruction which prescribes for pupil weaknesses. The process that leads to preconditioning is the assignment of priority to pupil weaknesses or exigencies. The purpose of priority assignments is to indicate the level of pupil strengths immediately below his level of exigency. The priority indicates the point below which preconditioning should be initiated.

Both preconditioning and individualization enhance pupil self-image by making the pupil aware of his strengths rather than his deficiencies. In this way, both processes condition the pupil to circumstances that would previously have activated exigent behavior. To a large extent, it is the unexpectedness and intensity of the exigency that determine which process is used to select the taxonomic components of treatment. For the pupil whose exigency is due to a disparity between reading achievement and intellectual potential, the process of individualization of instructional treatment is appropriate. Preconditioning is the suitable process for a pupil such as Pupil V whose exigent behavior creates classroom chaos.

The third point of interest centers on the instructional experience of nondiscrete pupil involvement. Regardless of the purpose for which the strategy is selected, whether for individualization, personalization or preconditioning, the choice of the taxonomic com-

ponents in the treatment is based on pupil needs in two or three behavioral areas, i.e., usually social, cognitive and affective. Therefore, it is intended that each of the seven taxonomic decisions will add its effect to the advancement of pupil development either socially, cognitively, affectively or to the modification of pupil behavior patterns in these three areas. Each of these treatments generates a degree of pupil engagement, the magnitude of which is determined by the appropriateness of the decisions to meet the pupil's needs. Some treatments heighten pupil engagement. It is the strategy segment of these treatments that is thought of as tapping the pupil's preferential wavelength.

In the course of providing preconditioning for Pupil V's exigent behavior, several options and alternative options are selected for this purpose and a number of different strategies are formed from the various combinations of these options. All of the strategies used in prescribing treatment for Pupil V effect pupil engagement, but one strategy is particularly effective in heightening Pupil V's Index of Engagement. Although these strategies can be defined in either descriptive taxonomic terms or coded numbers, it is impossible to determine what percentage of the total effect should be ascribed to each taxonomic component of the strategy.

In the decision making process, the components are referred to as separable units. In a sense, the components are probably nondiscrete because each interacts with the other to yield a coalescence of pupil behaviors that is more than the sum of its parts. When strategies have this effect, the pupil experiences nondiscrete involvement which is reflected in a significantly elevated Index of Engagement.

The fourth point of interest at this level of decision making is the surfacing of residual increments. Each strategy prescribed for a pupil has specific objectives. The objectives can be arranged in two broad classifications: those objectives that are directed toward the modification of nonacademic pupil behavior patterns and those that are directed toward pupil achievement in reading. The latter, when realized, are observable as explicit modifications of behavior that can be objectively evaluated and tested. The realization of objectives planned for the modification of nonacademic pupil behavior patterns does not lend itself to objective testing and can be evaluated only in the subjective and descriptive terms of the observer.

The objective of instructional treatment for Pupil B is for him to learn to read second grade sight words. Testing, along with Pupil B's reading performance, gives evidence that the objective is partially realized. The outcome is that Pupil B can read ten sight words of the group designated to be learned. In terms of residual increment, there is an explicitness to the outcome that is measurable, of course, if there is interest in examining the data for covert behaviors, such as the cognitive patterns by which Pupil B learned the ten words and those patterns that may have interfered with the learning of the other ten; then the examiner must resort to subjective, descriptive language in order to characterize the nature of pupil learning. This procedure of examining test data for evidence of covert behavior patterns is described in the first section of this chapter.

The statements that refer to the evaluation of covert behavioral processes leading to modified pupil academic patterns apply to the evaluation of modified pupil nonacademic behavior. There is a degree of subjectivity in nonacademic behavior patterns that cannot be eradicated as there are few test instruments to supply quantitative assessments of these behaviors.

A classroom teacher, after observing Pupil B, states that Pupil B, a seventh grader, exhibits a self-containment capacity which is equivalent to that of a preschool child. By what standards has the teacher formed such an evaluation? What norms are used, if any? And, if there are norms, do the norms apply to Pupil B? The same classroom teacher could

have said that Pupil B exhibits inadequate or inappropriate self-containment behaviors for a seventh grade child. This statement, however, also generates a host of questions, some of which are identical to those above. What is meant by inadequate? By what standard of adequacy is the pupil's behavior judged? What are the dimensions of the quality of adequacy? To what degree is Pupil B's self-containment level inadequate? The questioning process need not be continued; the ambiguities of the teacher's evaluation of Pupil B's self-containment behavior are obvious. And, in fact, such ambiguities would occur if the teacher were evaluating progressive rather than regressive behaviors.

Herein lies the value of the Taxonomy as an evaluative instrument. Since the options in the taxonomic categories are ordered along a developmental scale, the act of selecting an option for the pupil is also an act that specifies a reference point that has no value for anyone but the pupil for whom the option is chosen. The option itself names the objective for which instructional treatment is being prescribed. The pupil is being compared to nobody but himself. Residual increments of the self-containment and social behavior patterns intrinsic to the options in Instructional Setting and Instructional Mode are evaluated in terms of the pupil's upward movement from the reference point of the selected option which is further substantiated by an elevated Index of Engagement.

Residual increments in the other taxonomic categories of Basic Skill, Basic Subskill, Sequential Level, Sensory Modality Input and Sensory Modality Output are referentially expressible by the option's position in the scale of development and quantitatively in terms of test scores. When the quantitative assessments (test scores) and referential assessments (Indices of Engagement) are in equilibrium, residual increments of sufficient breadth to warrant the selection of another option are indicated. The pupil has learned a "piece of content" or a skill which, in becoming a part of his inventory of strengths, can no longer be utilized for the personalization of instructional treatment.

An example of a residual increment as an evaluation of pupil movement with reference to selected options is the following abstract from Pupil B's record: Pupil B has been prescribed the personalized Instructional Setting of option 3—Student-Student (Parallel). The decision to move him to this Instructional Setting, in which there is physical association, at least with a member of his peer group, is based on observed residual increments in Pupil B's self-contained behavior in Instructional Setting 2—Student Self-Instruction, using option 4—Test-Response of Instructional Mode substantiated by a sustained elevation in his Index of Engagement. In the newly prescribed personalized treatment for Pupil B, only the Instructional Setting has been changed; Instructional Mode remains the same, i.e., option 4—Test Response.

The other pupil involved in the prescription is working in a Problem Solving Mode, 8 of this category. In the course of using this treatment, it is noted that Pupil B occasionally asks the other pupil for assistance, a behavioral pattern that is unexpected but suitable. This is regarded as the surfacing of residual increments reflecting emerging patterns of modified behavior and indicating that Pupil B is in the process of transition from Instructional Setting 3—Student-Student (Parallel) to Instructional Setting 4—Student-Student (Interactive). In order to give impetus to the transition, the Sequential Level of the content used in the treatment is raised from option 3—Grades 4-6 to option 4—Grades 6 and above. Thus, Pupil B is forced to use the unexpected-suitable behavior patterns, i.e., to seek assistance from his companion more frequently.

The shift in Sequential Level options results in a depressed Index of Engagement that is marked but of short duration. The characterization of modified behavior as unexpected-suitable changes with a rising frequency of occurrence to expected-suitable behavior which, when accompanied by a high sustained Index of Engagement, indicates a residual increment

that is consonant with the objectives of the prescribed option and in equilibrium with quantifications of engagement.

Another example, drawn from the record of Pupil N, shows the relationship of residual increments to test score quantification. Test data from the Wepman and Diagnostic Tests demonstrate that, although Pupil N knows all the consonantal sounds, he cannot combine them to form the consonant blends. Two elements of the prescription are individualized, Instructional Setting 2—Student Self-Instruction and Instructional Mode 4—Test-Response. The other components of the prescription, including option 2—Auditory of Sensory Modality Input and 3—Vocal Response of Sensory Modality Output, are personalized. The objective of the treatment is to provide Pupil N with aural-oral practice in discriminating consonant blend sounds. At the initiation of treatment, there are ten blends that are not known by Pupil N. As practice proceeds, Pupil N is tested for residual increments. Although he has learned five consonant blends, there will be no modifications made in his prescription until the residual increments are equal to a test score of ten.

Upon the surfacing of residual increments, the project's coding system and questioning procedure are reactivated. The following questions are characteristic of the reactivation: Are the residual increments to be coded as **S** (stable)? If yes, then are they $S^C$ (stable-closed) or $S^F$ (stable-flexible)? If $S^C$ (stable-closed), then what are the conditions that inhibit flexibility? And what taxonomic components can be prescribed to negate these conditions? If $S^F$, then, can transfer be effected from one category of learning behavior to another? If yes, what are the exigencies that may occur during the transfer? What preconditioning can be prescribed for the pupil that will neutralize the possibility and reduce the probability of transfer crises? In due course, these questions and coded evaluations tend to increase the consciousness of taxonomic choice and to proliferate alternative choices of strategies which, in turn, effect a larger increment in residual skills.

### Decision Making Process—Fourth Level

The fourth and final decision making level of taxonomic instruction has been reached; this is referred to as the gestalten level of decision making. At this level, the view is held that learning is a collective construct, a gestalt, synthesized from the interrelatedness of all the mental and physical processes by which knowledge is acquired. In turn, each of the processes is a gestalt of its own elements.

The prerequisite to practicing gestalten decision making in planning strategies for the remediation and modification of pupil learning behavior is the accumulation of data that is inclusive of the attitudinal, cognitive, affective, emotional, psychological, physiological and pathological elements of pupil learning patterns. Since learning does not take place in a vacuum but within an environment, the data should include the conditions of the family, the home, any noneducational institutions with which the child is or was associated and, of course, the schools he has attended.

Admittedly, this is too large a task for the project staff to accomplish by itself. The assistance of the other professional members of the school staff is required for both the accumulation and the interpretation of the data. In addition to the project staff, a full team would consist of the nurse, the doctor, the psychologist, the psychiatrist, the social worker and the pupil's parents. The absence of a few members from this complement, however, would invalidate only those portions of the procedure that are the province of the missing services. Although a partial application of the gestalten view is less effective than a full application, the partially applied view remains a viable instrument for the development of strategies.

The operation of the gestalten decision making process is the same as that described previously for the other decision making processes. Actually, each process spirals outward from the preceding one, adding clusters of behavioral elements in the course of its movement. The gestalten view, then, is the fully enunciated process in which the three other processes are conjoined. Central to the decision making process on all four levels are the learning outcomes which are effected by instructional treatment. These learning outcomes, referred to previously as residual increments, behavioral modifications or modified patterns of behavior, are analyzed, evaluated and, in turn, effect further decisions. However, it is at the gestalten level that a complete elaboration of outcomes is possible. It is, of course, the large collection of data that permits the elaboration.

The outcomes toward which decision making is directed are of three kinds, i.e., criteria, objectives and behaviors. Not only is there an intrarelatedness of outcomes (since one outcome proceeds from the other in either direction) but also there is an interrelatedness of outcomes to decision making and decision making to outcomes as well, for although decision making is directed toward effecting the outcomes, in reversal the outcomes form the bases for decision making.

As outcomes effected by the strategies evolving from the decision making process, criteria are broad philosophic statements of purpose. "All children should function at the peak of their potentials." "All children should be self-directive." Although these purposes exceed the design of the Taxonomy, the course of instruction can be set in the direction of these broadly stated goals within the Taxonomy's purview. As the bases for decision making, criteria effect few modifications in decision making. The need for continual adjustment of strategy to criteria is not immediate, for the aggregation of behavior patterns consonant with the criteria is usually a distant expectation.

Objectives viewed as outcomes toward which decision making is directed are statements of explicit goals. Since the Taxonomy is an instrument designed to develop reading ability, objectives are expressed either in terms of reading skills or of behavior patterns that facilitate the acquisition of reading skills. For each pupil in this population, there is usually a plethora of objectives that necessitates arranging the objectives in an order of priority. Thus, for Pupil Z, the objective that takes precedence may be the development of visual perception, whereas for Pupil X, the objective with highest priority is to moderate the severe anxiety state under which X functions in learning situations.

Objectives have considerable significance as the bases of decision making. Since objectives are achievable in relatively short order, modifications in decision making are frequent. For example, the development of visual perception is the initial objective in selecting instructional treatment strategies for Pupil Z. When Pupil Z exhibits modified behavior indicating the development of visual perception, the next objective in order of priority is the development of visual memory. It is not to be expected that the strategies which mediated Pupil Z's behavior for visual perception can also effect expansion of his visual memory. As a result of the change in objective, the decision making process is reactivated for the purpose of selecting strategies congruous to the nature of the objective.

Modification of pupil behavior as an outcome of decision making is highly specific and, therefore, incurs the least delay of the three types of outcomes in being effected. Consequently, modified pupil behavior acts with greater force to stimulate the decision making process than either criteria or objectives. Pupil M is to learn to read three new words. This is the specifically modified behavior being sought in the selection of strategies for Pupil M. Pupil M's behavior is modified; he can read the three words. The next behavior pattern to be modified proceeds directly from the retention of the three words, all of which begin with the letter *t*. The new behavioral outcome to be effected is Pupil M's

discrimination of the /t/ sound in the initial position. Decision making focuses on the selection of the taxonomic options that will consummate the desired behavior pattern.

Although the outcomes appear to be discrete, there is an intrarelatedness of outcomes, referred to previously, that offsets the apparent discreteness. Criteria are relevant to objectives; both of them, separately and in conjunction, are relevant to behaviors. The reverse direction of relevancy is also present. For example, there is little logic in setting an objective to effect the development of visual perception and then following it with the strategies selected for the purpose of modifying pupil behavior patterns to aurally discriminate three consonant letters. In the absence of this intrarelatedness, there can be no organization in the sequence of treatment. It is in the intrarelatedness of the three outcomes that a gestalt of instruction is created.

Section 2 of Chapter III contains a descriptive account of the rationale and methods used in developing strategies for the enhancement of pupil receptivity to the content of the instructional message. Also, strategies are viewed as the behavioral options that are available to the teacher for the transmission of information. When the two components of the strategy (means of teacher transmission and means of pupil reception) are in correspondence, the results are the modification of pupil behavior toward increased suitability and elevation of pupil engagement. Strategies are composed of selected options in the last four elements of the Taxonomy (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output) and are the products of a series of decisions that result from a series of questions generated by evidence from case histories, diagnoses, observations and evaluations. The process of option selection is ordered from evidence to questions to decisions to strategies. Since observations of the pupil in performance of the strategy yield an accumulation of additional information which generates another series of questions, the process is reactivated to produce decision making levels of ascending refinement in analyses and evaluations.

There are four levels of decision making, each arising from the preceding level and spiraling outward to encompass the expanding body of pupil data. At the first level of decision making in the selection of taxonomic options of the strategy, attention is directed to the pupil's capacity for self-containment, social development and language facility. The criteria of expectancy and suitability are applied to the learning patterns the pupil manifests in performing the prescribed strategy.

Decision making at the second level is a coded system of evaluation that is used to examine the pupil's learning behaviors for stability of occurrence, degree of closure and flexibility, evidence of pupil transition from one level of development to another, from one system of Sensory Modality Input to another, from one system of communication Sensory Modality Output to another, the emerging patterns of behavior that appear to be in a state of transition and the priorities to be set by the staff for the next round of decision making.

Patterns of exigency in pupil behavior, preconditioning of behaviors to eradicate the element of exigency, development of nondiscrete pupil involvement by means of appropriate decisions in the selection of taxonomic options and evidence of residual increments are central to the decision making process at the third level.

The fourth and final level of decision making is concerned with the totality of pupil learning behavior that is inclusive of the attitudinal, cognitive, affective, emotional, psychological, physiological and pathological elements of learning. The assistance of other professional groups is required for the accumulation and interpretation of the data that is requisite for this level of decision making. The staff, however, contends that even a partial application of the process at this level is a viable instrument for the development of strategies. This level of decision making is considered a gestalten process in which the three

other levels of decision making are conjoined.

The large accumulation of data, by means of which the gestalten decision making process is effected, permits the refinement of strategy outcomes, i.e., criteria, objectives and behaviors. The interrelatedness of the three kinds of outcomes produce a gestalt of instructional treatment from which ideal strategies evolve. Ideal strategies are those which change, modify and intervene in the pupil's unsuitable behavior and habituate the pupil to behavior patterns that are suitable for the pupil's developmental level in a number of environmental contexts.

## CHAPTER IV

# THE TAXONOMY IN USE: FOUR CASE STUDIES

In the previous three chapters, the principles of the Taxonomic Instruction Project were described and explained. This chapter presents four case studies to illustrate how the Taxonomy was used to individualize and personalize instruction for four boys. The objective is to show why and how instructional treatments were selected, and what modifications were made in the treatments as they continued over a period of time.

The staff members who worked with the four boys and their teachers did not consult with each other as the case studies were prepared, in order to avoid arriving at common approaches to the detriment of the individual nature of each of the studies. Because of this independence, there are differences in the format of the studies. These inconsistencies, however, are offset by the fact that each study reflects the use of the Taxonomy in dynamic classroom settings.

## CASE STUDY – Q

Q, a boy twelve years of age, was transferred in September 1968 from his neighborhood school to P.S. 9, a school for emotionally disturbed, socially maladjusted boys. The salient details of Q's history were assembled for the purpose of providing information for the project staff at the time Q became a candidate for taxonomic instruction in September 1969.

Q was born in January 1958 after what is recalled by his mother as being a full-term but difficult pregnancy, during which there were frequent spells of nausea and numerous fainting incidents. A Caesarian section terminated a prolonged and difficult delivery. The mother stated that the pregnancy was totally unexpected as she felt she was too old to conceive. The mother further reported that at birth, Q had difficulty breathing and was retained in the hospital for observation of a possible heart defect. Q was brought to the Cardiac Clinic of Queens General Hospital regularly until he was four years old.

As the mother recalled, the child's development was normal; Q walked by fifteen months of age and began to talk at the end of the first year. Also, his mother described the child as being "nervous" and "too active." Another source of irritation for the mother was Q's unusual eating habits, notably his adamant preference for starches and rejection of nearly all other foods.

In a letter to Elmhurst General Hospital, dated January 1966, the principal of the school then being attended by Q stated that Q had a long history of "severely disruptive behavior in school." In the opinion of the principal and Q's teachers, the child posed a threat to the welfare of the other pupils by his aggressive habits of hitting other children, pushing them down stairs and slamming doors in their faces. The consensus of the school staff was that Q could not be contained within the regular classroom environment. Previously, the child had suffered two temporary suspensions from school. The principal anticipated that without clinical services, it would be necessary to place Q under full administrative suspension within a short period of time.

The next notation, dated February 1, 1966, in Q's file recorded the child's suspension from school. The next entry of February 17, 1966, consisted of the results of a psychological battery previously administered to Q, although the exact date and location of the examination were not specified. The WISC, Bender Gestalt and Rorschach were the instruments used in examining Q. The results were:

| | | |
|---|---|---|
| WISC: | Verbal Scale: | 72 |
| | Performance Scale: | 99 |
| | Full Scale: | 83 |

The results were described as follows:

> Verbal ability is clearly inferior to nonverbal and seems to involve both difficulty in abstraction and a tendency for loose association of thought. As an example of the latter, Q's reply to the question 'What are the four seasons of the year?' was, 'Summer, winter, cold—when it cold you got to put your boots on. You got to stay in the house when you got a cold.' Here Q began to answer correctly, then associated from winter to cold, then from cold weather to the illness 'cold.' Q's intellectual capacity was assessed as being 'dull normal' and the potential of his capacity as 'average.'

Q's responses to the Rorschach items led to the following interpretation:

> Realistically, the patient sees himself as being incapable of coping adequately with his environment. He does not have the intellectual and repressive defenses typical of neurotic youngsters and is much more likely to express his impulses in action. Anxiety is high and emotional control and social judgment are poor.
>
> Sexual identification appears weak, the female being viewed as the more powerful and adequate sex. The ability of the male to cope with his environment (and with the female) appears minimal.

Q's performance on the Bender Gestalt was reported as follows:

> Q's Bender performance is poor in that it contains rotations, contaminations of responses (running one design into and incorporating it with another) and perseveration. The possibility of cerebral damage must, therefore, be raised although little support for this hypothesis can be gained from either the WISC or the Rorschach. His behavioral difficulties would seem to be primarily, if not entirely, psychogenic.

Apparently, the principal's referral letter to the hospital, cited previously, requested the psychological examination for Q's possible placement in a CRMD class (Class for Retarded Mental Development) since the hospital's reply contained the following recommendations:

> In reply to the original reference question, placement in a CRMD class does not seem appropriate. Ideally, a small class for emotionally disturbed youngsters of normal intelligence would be the best placement. In the absence of such a facility, the classroom teacher would do well to seat the boy near her desk where she could exercise greater control over him. Special status as a monitor of some sort (preferably involving physical activity such as cleaning blackboards) would be of value in increasing his sense of self-worth and in allowing him the opportunity to discharge some of the tension he feels in a constructive way.

In a summarization of the hospital clinician's diagnosis of the recommendations for Q, the following statements were recorded:

> Here he was seen as a child of dull normal intelligence with a speech impedi-

ment, concrete and incoherent thinking, poor concept formation and body image, confused sexual identification. He was diagnosed as suffering from a schizophrenic reaction, childhood type, and the recommendation was made to the school to place him in a Junior Guidance class. In our clinic, he will be treated with drugs and the mother will be offered counseling, perhaps in a group.

While Q was being examined, his mother was interviewed by a member of the clinic staff. Q was present for a part of the interview. It was learned that she was forty-three years old and was living in a three room apartment with two of her three children, one of the two being the patient Q. The other occupant was her thirty year old son. Q shared a bedroom with his mother. The other child of the family was a twenty-eight year old female who was married and residing in her own household with her husband. When asked at this interview the reason why he had to leave the neighborhood school, Q replied that "everybody was hitting me—the kids and the teacher, and the teacher hits harder than the kids." Of all the academic subjects, Q expressed a preference for writing and evaluated his own performance as "good."

At this interview Q was described in the following terms:

> This is a tall, husky Negro boy, too big for his age. He has his mouth open most of the time with his tongue showing. When he walks into the office he relates instantaneously and superficially which does not change throughout the whole interview. His speech is very indistinct, i.e., he has poor enunciation and he stutters and stammers. He is right handed, right legged, confuses right and left on the interviewer but differentiates it fairly well on himself. He doesn't show specific neurological deficits except that he looks somewhat clumsy, . . . His gait is normal but at one point is wide spaced. His whirling is pronounced. Intellectual functioning is dull, perhaps even lower. His thinking is concrete—concept formation poor. He shows a thought disorder with some incoherence. His body image is poor and he has difficulties in delineating his ego boundaries. Sexual identification is confused.

In November 1967, when Q was nine years old, the Children's Clinic referred him for speech evaluation. Although the place of referral is not indicated, Q's record contains the notation that Q was receiving speech therapy in his school. During the speech evaluation session, Q's behavior was described as "cooperative but restless during testing." The following is the evaluation of Q's speech as transcribed in the child's school record:

*Expressive Abilities*

A. Oral Expression—Q's language was appropriate but immature in content and structure. His conversational speech was poorly organized and agrammatical.

B. Articulation—A mild to moderate articulatory defect was noted. Inconsistent substitutions. Distortions and emissions of most final consonants. Q can correct most of his defective sounds with maximum stimulations.

C. Examination of Speech Musculature—Teeth, slight open bite, missing maxillary lateral incisors.

*Impression*

A mild to moderate articulatory defect partially caused by open bite and missing maxillary lateral incisors.

*Recommendations*

1. Continue speech therapy in school.
2. Re-evaluation in six months.

The record contains no other entries of speech evaluation. Upon admission in September 1968 to the school for emotionally disturbed, socially maladjusted boys, Q was examined by the school psychiatrist and psychologist. A WISC was administered and the results were as follows:

| | |
|---|---|
| Verbal Scale: | 90 |
| Performance Scale: | 99 |
| Full Scale: | 93 |

The suggestion was advanced that Q's speech impediment was caused by hearing blocks of psychogenic origin.

In the course of Q's first year in the special school, the teacher's comments emphasized the negative features of Q's behavior, such as the child's inordinate need for attention, lack of self-control, extreme immaturity, inability to get along with his classmates and the slow rate at which Q learned. On a number of occasions, the teacher recommended Q's placement in a class for either mentally retarded or brain injured children. In December 1969, Q's second year in the school and his first as a recipient of taxonomic instruction, the teacher's comments indicated signs of Q's progress:

> Q is trying very hard at his work. He will always do all his homework. Q is improving in reading and math daily. He is more comfortable doing math. Q is always cooperative towards his peers and teachers. He is quite fearful of his peers because he is not capable of defending himself. I believe Q will break through in reading by the end of the school year. He can see success and is striving hard.

The last entry of significance indicated that throughout this entire period of time, Q had been receiving psychological services from some clinic, probably the Children's Clinic at Queens General Hospital. The entry was a list of medications prescribed for Q and the time schedule when each of the medications was to be taken: Dexidrine 10 mg. in the A.M., Thorazine spansule 75 mg. at 3 P.M., Thorazine tablets 25 mg. at bedtime.

### Diagnostic Battery

The following data have been derived from the analyses of Q's test scores and observations of Q's behavior during the administration of three diagnostic instruments at the time of Q's admission to the project in September 1969: the Wepman Auditory Discrimination Test, the Taxonomic Instruction Project's Diagnostic Reading Test and the Gates-MacGinitie Reading Test (Vocabulary and Comprehension). All tests were pre- and post-administered using equivalent forms with the exception of the project's Diagnostic for which only one form has been devised. The Dolch Basic Sight Word Test was not given to Q because, as previously stated in Section 1 of Chapter III, the Dolch is administered only to pupils scoring within a second to fourth grade range on the Gates-MacGinitie Reading Tests. Since Q's score on the Gates was below the floor of this range, it was assumed that Q's sight vocabulary was too restricted to justify the use of the Dolch.

#### *Wepman Auditory Discrimination Test*

A rationale for the use of the Wepman and a general analysis of the test format and its items have been offered in the first part of Chapter III. In the following section, Q's Wepman scores and test behavior are recorded, described and analyzed for two purposes: to formulate tentative hypotheses for selecting the taxonomic components of an instructional

treatment for Q and to develop the inventories of strengths and weaknesses, known items, nearly known items and unknown items from which to draw options for the individualization or personalization of instruction. Wepman test scores provide guidelines for the selection of Sensory Modality Input options, basic to the strategy segment of instructional treatment, and the options of Basic Skill, Subskill and Sequential Level which form the content segment of instructional treatment.

Forms I and II of the Wepman were given to Q during the academic year of 1969-1970. The former was given at the beginning of the year in September, the latter in May. Q's test results are as follows:

| | | X Error Score | Y Error Score |
|---|---|---|---|
| Pre-Test—September 1969 | Form I | 14/30 | 0/10 |
| Post-Test—May 1970 | Form II | 5/30 | 0/10 |

As previously indicated, the scores represent the number of errors made by the pupil in responding to paired words. The X score is the number of inappropriate responses the pupil made to paired words that are different in one of three ways: initial consonant, medial vowel and final consonant. The Y score indicates the number of pupil errors in identifying paired words that are identical. Thus, in a glance, it is obvious that all of Q's error responses are of the X type items such as *pork-cork, tub-tug,* whereas no error is noted for Y type test items such as *pose-pose.*

*Analysis of Errors*

The number of Q's X errors—fourteen—is considerably above Wepman's norm of three for children eight years of age or older. In fact, Q's number of errors is close to the level of invalidity—fifteen—set by Wepman. The error responses to the X type test items in Form I are as follows:

| Test Item No. | Paired Words | Location of Paired Word Difference |
|---|---|---|
| 1 | tub-tug | final consonant position |
| 3 | web-wed | final consonant position |
| 4 | leg-led | final consonant position |
| 9 | vow-thou | initial consonant position |
| 13 | thread-shred | initial consonant position |
| 17 | pat-pack | final consonant position |
| 20 | thimble-symbol | initial consonant position |
| 21 | cat-cap | final consonant position |
| 22 | din-bin | initial consonant position |
| 23 | lath-lash | final consonant position |
| 25 | clothe-clove | final consonant position |
| 28 | sheaf-sheath | final consonant position |
| 32 | fie-thigh | final consonant position |
| 39 | lease-leash | final consonant position |

The third column of the above list provides the position of difference in the paired words to which Q responded inadequately. Q's errors reflect his inability to discriminate the difference between the paired stimulus words of the test items and, therefore, the location

of inadequate aural discrimination can be specified. Thus, Q's error responses are classified in the following manner:

| Errors By Location: | Initial Position | Medial Position | Final Position |
|---|---|---|---|
| | 5 | 0 | 9 |

When the questioning procedure, described in the first section of Chapter III, was applied to this data, items for inclusion in Q's inventories of known, nearly known and unknown were discovered. Q's inventory of known, from which individualization of instruction would be initiated, had the following items:

1. Some aural discrimination ability. Q responded appropriately to twenty-six test items out of forty.
2. The twenty-six appropriate responses included all of the test's ten paired identical words. Q was able to discriminate the "sameness" of identical words.
3. The remaining sixteen appropriate responses included the test's four paired vocalic discriminations. Q was able to discriminate vocalic differences.
4. An analysis of Q's responses revealed that three paired sounds were discriminable in both the initial and final positions: *p - c* (k)—*pork-cork, shake-shape; m - n—moon-noon, dim-din; s - f—sought-fought, muff-muss.*

Q's inventory of nearly known from which personalization of instruction would be initiated included the following items:

1. Paired sounds discriminable in the initial position only: *g - d, b - g, t - p, k - t, sh - s*
2. Paired sounds discriminable in the final position only: *s - th*

The following aural perception items, which Q discriminated in neither position, constitute his inventory of unknown: *v - th, th - sh, d - b, f - th.* As the items in the inventory of nearly known are required by Q, they become incorporated into the inventory of known, and these items in the inventory of unknown replace the nearly known items for personalization of treatment.

In reviewing Q's inventory of known, more strength seemed to be present than was anticipated, given Q's speech impediment. Therefore, much of Q's aural perceptual behavior was characterized as unexpected-suitable. However, further reflection led to the conclusion that the strength was more apparent than real because the known items were isolated splinter skills that had not been integrated into a system of aural perception available for use in all learning situations. Actually, then, Q's aural perception was expected-unsuitable behavior. The ultimate behavior being sought for Q through instructional treatment was the development of an integrated aural perceptual system that functioned as a learning tool. Before this objective could be achieved, other aspects of Q's behavior were probably in need of preconditioning. Identification of these behaviors was reserved for further observation of Q in the classroom.

Q's behavior during the Wepman was unexpected-suitable. After a short period of anxiety, Q related well to the examiner, appeared to be highly motivated, followed directions well, gained understanding of the task requirement quickly, required no repetition of test items and responded to the test stimuli with alacrity. At the end of the testing session, Q appeared to be quite pleased with his performance; Q was sure he did "very good."

These observations had much significance for the selection of instructional treatment components for both content and strategy. In content, the relevant Basic Skills were options 1 and 2, Cognitive-Perceptual and Language Analysis respectively. The only relevant Subskill

in the Cognitive-Perceptual category appeared to be Memory Span (option 2) which, as yet, had not been fully measured. It seemed that Q was able to mentally retain and compare two auditory stimuli but additional information was required to substantiate this claim. In Language Analysis, the relevant Subskills were options 1, 2 and 3, Consonants, Vowels and Sight Vocabulary respectively, although the exact dimensions of Q's ability to use consonants and vowels were still to be determined from the results of the Taxonomic Instruction Project's Diagnostic Reading Test. It was obvious from the data that the appropriate Sequential Level for Q's aural perceptual capacity was option 1—Grades 2 and Below.

For the components of strategy, Q's observed behavior during testing was translated into taxonomic terms. The satisfactory relationship between Q and the examiner suggested selecting option 7 for Instructional Setting. The question-answer format of the Wepman test indicated option 4, Test-Response, in Instructional Mode. Option 7, Programmed Response also in Instructional Mode, was considered consonant with Q's ability to follow directions and, therefore, was selected as an alternative for option 4. Q's ease during testing determined the selection of Sensory Modality Input 2—Auditory and Sensory Modality Output 3—Vocal Response. Thus, instructional treatment for Q included these coded possibilities:

1 2 1 1 4 2 3 Basic Skill 1—Cognitive-Perceptual, Subskill 2—Memory Span, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test Response, Sensory Modality Input 2—Auditory, Sensory Modality Output 3—Vocal Response.

1 2 1 1 7 2 3 The change in instructional treatment is in the taxonomic component of Instructional Mode wherein option 7—Programmed Response has been substituted for option 4—Test-Response in the preceding prescription.

These prescriptions represented tentative decisions that were based on the data gathered from Q's Wepman scores and behavior. All of the decisions were felt to be in accord with the data from Q's cumulative record with the possible exception of the Sensory Modality Output which was option 3—Vocal Response. During one of the clinic interviews, Q expressed a preference for writing. Therefore, Q's behavior with tasks requiring oral expression was carefully observed. The finality of these decisions depended on the nature of the data accumulated in the course of further testing.

Q's post-test Wepman scores indicated improvement in aural perception of sounds in paired words. As previously stated, Q made no Y type errors (paired identical words); five X type errors were recorded, a decline of nine errors from the pre-test score. Analysis of the inappropriate responses revealed that all were aural perceptual errors in discriminating final consonants. Therefore, it appeared that instructional treatment brought about an aural perceptual pattern in which discrimination of consonantal differences in the initial position had emerged as a residual increment of learning. In addition to the stability of the aural pattern, the qualities of "closedness" and flexibility remained to be evaluated from the other test data.

*Taxonomic Instruction Project's Diagnostic Reading Test*

It is the project's policy to administer the Diagnostic at the beginning and end of the academic year. There is only one form of this test and a comparison of the two sets of test results indicates whether or not any improvement has been made in the pupil's ability to manipulate phonic elements. It was recognized that the Diagnostic can be self-defeating for pupils with profound disability in word-attack skills. For these children, there is a partial

test administration procedure in which the extent of the testing is determined by the examiner's judgment of how painful the testing experience is for the child. Since Q is severely deficient in phonic skills, pre- and post-testing were restricted to Sections I, II and VIII.

Section I

1. *l b t c k v n y r x q z d f g h j s w m p*
2. *l b t c k v n y r z d f g h j s w m p*

The pupil is given a stimulus card on which these letters are printed. In the first task, the pupil is required to name the letters of the alphabet; in the second, the sound(s) for each letter are the expected response. In this task, the pupil is urged to give both the "hard" and "soft" sounds for the letters *c* and *g*. The two tasks are scored separately and each score represents the number of correct responses out of a total of twenty-one. Q's pre- and post-test results were as follows:

| | Names of Letters | Sounds of Letters |
|---|---|---|
| Pre-Test—September 1969 | 15/21 | 5/21 |
| Post-Test—May 1970 | 20/21 | 19/21 |

An inspection of the examiner's scoring sheets showed that at the pre-test session, Q did not know the names of the alphabet letters *k, v, z, f, g, w*. The incorrect response on the post-test was in naming the letter *q* which Q called *g*. In the pre-test, the correct sounds were given for the following letters: *b, t, hard, c, d* and *p*. In the post-test, Q's responses were correct except for the *w* sound associated with the letter *y* and the answer of *Friday* for the sound of *w*. Q's performance on the post-test is described in greater detail later in this section.

Section II

In Section II of the Taxonomic Instruction Project's Diagnostic Reading Test, the pupil is given a stimulus card with the vowels printed in lower-case letters across the width of the card: *a e i o u*. The first task requires the child to name the vowels, the second to give the short sounds of the vowels, the third to give the long sounds, the fourth to point to the letter that corresponds to the short vowel sound made by the examiner. The fifth task is the same as the fourth with letter correspondence to long vowel sound. Each task is scored separately with correct responses receiving a score of one with a total of five. Q's test results were as follows:

1. Name the Vowels
   Pre-Test—September 1969 — 3/5 *a e o* were known
   Post-Test—May 1970 — 5/5 All vowel names were known

2. Vowels—Short Sounds
   Pre-Test—September 1969 — 0/5
   Post-Test—May 1970 — 1/5 short *a* sound known

3. Vowels—Long Sounds
   Pre-Test—September 1969 — 0/5
   Post-Test—May 1970 — 0/5

4. Vowel—Short Sound Correspondence
   Pre-Test—September 1969 — 0/5
   Post-Test—May 1970 — 1/5 short *a*

5. Vowel—Long Sound Correspondence
   Pre-Test—September 1969 — 0/5
   Post-Test—May 1970 — 5/5

In Section VIII of the Diagnostic, the pupil is asked to reproduce in sequence the letters of the alphabet, first in upper-case form, then in lower-case form. A sheet of paper with two sets of twenty-six dashes is provided for the performance of this task. Proper administration of this section requires observation of the pupil's formation of letters, the sequencing of letters, letter reversals, mixing of upper- and lower-case and the length of performance time. It is the staff's contention that at this level of elementary education, grades 5-8, the alphabet should be known in its entirety. Therefore, each part of Section VIII is scored either *yes* meaning known or *no* meaning unknown. Of course, correctly reproduced letters and any learned sequential segments are noted for the purpose of establishing the inventories of known, nearly known and unknown from which to draw the content of individualized and personalized treatment. Q's pre- and post-performance with the examiner's annotations are duplicated in **Figure 1**.

On the basis of the staff's criterion, each of Q's reproductions received a *no* rating. As anticipated, Q's learning behavior was unsuitable, but it is obvious that the post-test performance represented a considerable improvement in skill. Although not perfectly executed and still in transition, the evidence indicated that the alphabet was emerging as a stable learning pattern in which Q's feedback mechanism had begun to function for self-correction. The self-correction facet of Q's learning pattern was unexpected-suitable behavior. The pre-test results supplied not only the content of instructional treatment but evidence of visual perceptual difficulty as well, i.e., the reversals in the reproduction of the *J*'s, the lower-case *h* reproduced as an *n* and the confusion of lower- and upper-case *D*'s.

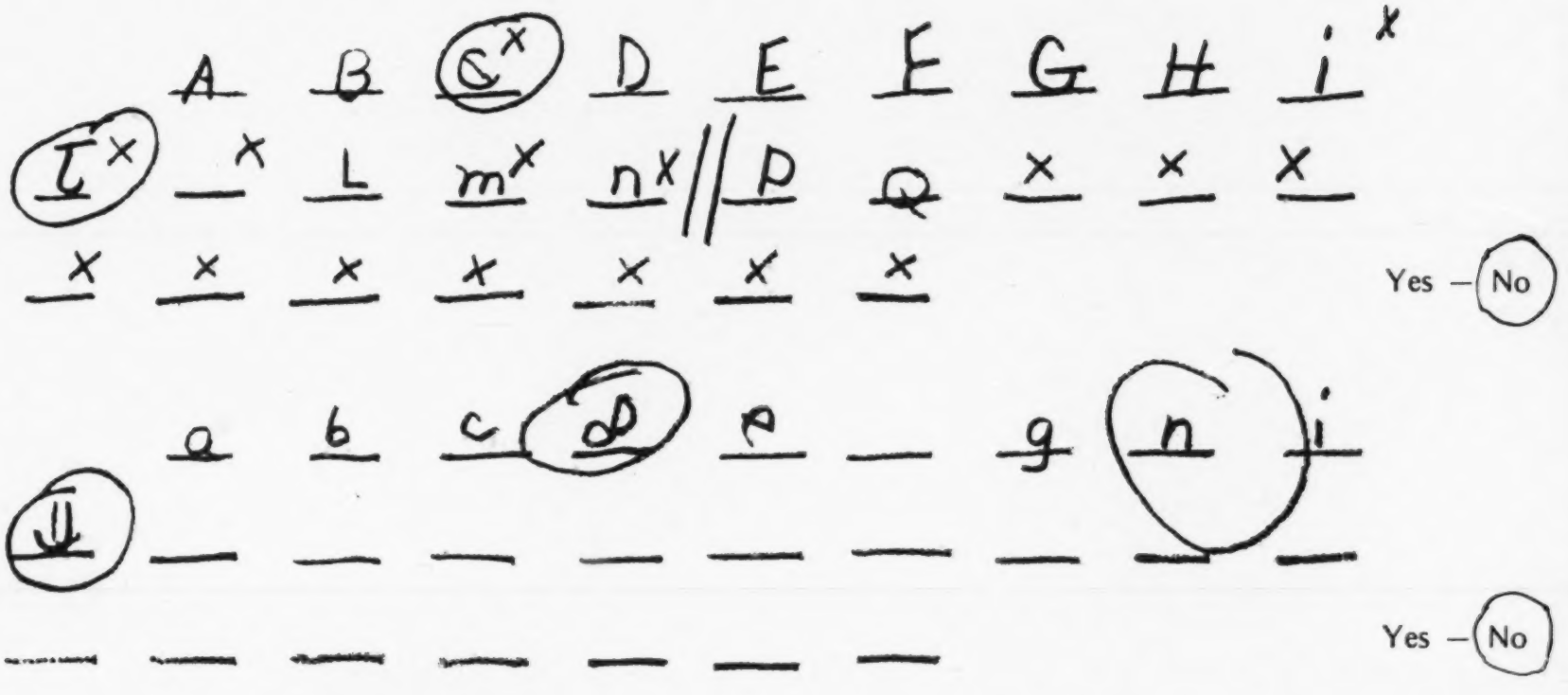
These visual perceptual anomalies hold significance for the selection of the Sensory Modality Input option. The anomalies seemed to indicate that Q's Visual Input system was not functioning as well as his auditory channel even though the latter was evaluated as an operational system of below normal capacity. Then, if this were the case, the question arose as to the possibility of Kinesthetic option 1 in Sensory Modality Input being the preferential system for reception of information. Thus, decisions were made 1) to reserve Sensory Modality Input 2—Auditory, with known content for individualized treatment, 2) to reserve Sensory Modality Input 3—Visual, with known content for personalized treatment, 3) to experiment with Sensory Modality Input 1—Kinesthetic, with known content in order to ascertain Q's possible preferentiality for this input system.

Additional data were gathered from Q's behavior during the Diagnostic Reading Test session. All of these demonstrated Q's anxiety and frustration with the test content and situation, the behavior being in direct contrast to Q's sense of ease during the Wepman testing. The following notations were recorded immediately after the testing session:

- Wiggled finger up and down on stimulus card. In some instances, finger movement may have interfered with vision.
- Tapped foot during times when unsure of response.

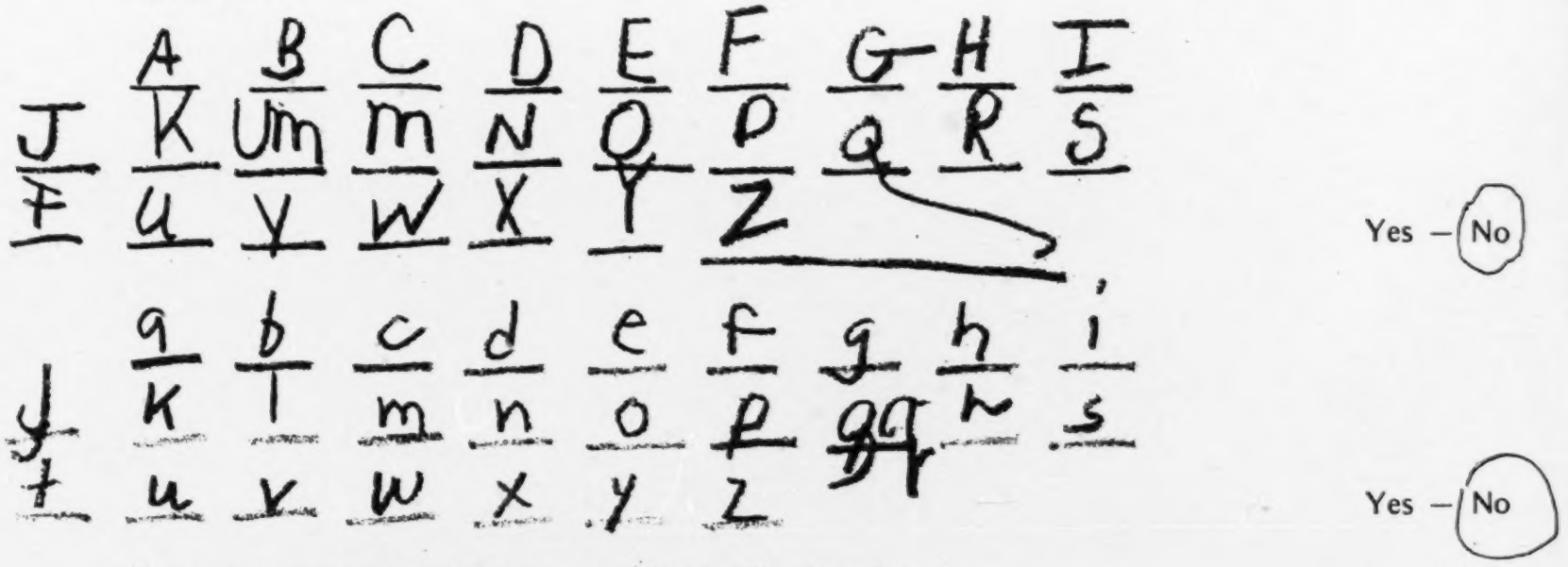
Figure I

*PRE-TEST*




Note:
1. *C* — *S* confusion
2. Reversal of *J*
3. Omission of *O* in the *L* to *Q* sequence
4. Upper- and lower-case mixture
5. *h* — *n* similarity
6. Corrected reversal of *J*

*POST-TEST*




Note:
1. *L* was inserted when error called to Q's attention
2. Duplication of letter *M*
3. *T* self-corrected
4. Letters *Q* and *Y* first omitted then inserted when examiner traced letters on pupil's back.
5. *j* self-corrected; first reproduced capital letter
6. Self-correction of letter *l* which was first reproduced as undotted *i*
7. Dissatisfaction with letter *q;* cursive *q* reproduced first then printed form

- Gained confidence, showed pleasure by smiling when Q thought his response was correct.
- Wiggled in chair.
- Thumped knuckles on table while waiting between items.
- Kept checking to see examiner's notations on scoring sheet. However, never requested an explanation of the markings.
- Speech impediment became more pronounced as difficulty of task increased.
- Very slow retrieval of information.

All of these notations were regarded as evidence that confirmed the appropriateness of the decisions mentioned above. Vision definitely seemed to be a more tension producing input than audition.

The relevant Basic Skills still appeared to be options 1 and 2, Cognitive-Perceptual and Language Analysis respectively. But, with the data from the Diagnostic, all five of the Subskills of Basic Skill 1—Cognitive-Perceptual appeared applicable if the Sequential Level option was restricted to 1—Grades 2 and Below for preconditioning learning patterns that are essential to the development of visual perception.

For the components of strategy, no data had been collected that warranted modification of the previous decisions based on Q's Wepman test results. Option 7—Teacher-Student was to be retained as the Instructional Setting, while for Instructional Mode, the decision was made to use option 1—Play-Puzzle and 2—Play-Chance in addition to the previously selected options of 4—Test-Response and 7—Programmed Response. The selection of the additional Instructional Modes issued from the previous decision to experiment with Sensory Modality Input 1—Kinesthetic. The play options of the Instructional Mode category lend themselves effectively to kinesthetic reception. Although the Sensory Modality Output 3—Vocal Response was retained, the intensification of Q's speech impediment while under test stress has cast some doubt on the appropriateness of the choice. In addition, Sensory Modality Output 2—Motoric Response (gestures and movement) has been selected because of its compatibility with a Kinesthetic Input.

The combinational use of the original and additional options of the taxonomic categories has expanded the possible instructional treatments for Q to the extent that a complete listing is impracticable. Therefore, only a few of the treatments are coded and described below:

1 1 1 7 1 1 3 Basic Skill 1—Cognitive-Perceptual, Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 1—Play-Puzzle, Sensory Modality Input 1—Kinesthetic, Sensory Modality Output 3—Vocal Response.

1 2 1 7 1 1 3 The change is in the second digit of the code and specifies a change to Subskill option 2—Memory Span.

1 3 1 7 1 1 2 The change is in the second digit of the code and specifies a change to Subskill 3—Directionality—Laterality and in Sensory Modality Output to Subskill 2—Motoric Response (gestures or movement).

Again, these treatments represent tentative decisions that are based on only part of the data. Modifications may be necessary when Q's test results on the Gates-MacGinitie Reading Test are analyzed. Q's reaction to the treatment, which is described in a later section of the report, will be the ultimate determinant of the need for treatment modification.

*Gates-MacGinitie Reading Test*

The last diagnostic instrument used to determine Q's learning strengths and deficiencies was the Gates-MacGinitie Reading Test which consists of vocabulary and comprehension subtests. As stated previously in Section I of Chapter III, the Gates-MacGinitie Reading Test provides a score in terms of grade level for each of the subtests. These scores under optimal testing conditions represent the functional level at which reading instruction can be initiated and are convertible to taxonomic terms in the Sequential Level, the third division of the Taxonomy. The child's behavior during testing and his manner of manipulating the test items yield indispensable data for the decisions to be made in the other taxonomic divisions.

Two equivalent forms of the test were used in the course of the academic year—B Form-1 for pre-testing and the alternate B Form-2 for post-testing. A descriptive account of the Gates-MacGinitie Reading Test, including the nature of the tasks, the test items and administrative procedures is offered in the first section of Chapter III. For the present, it is sufficient to note that the vocabulary subtest consists of forty-eight items of increasing difficulty, each of which contains an illustrated object and four words. The illustrated object is defined by one of the four words. The pupil's task is to circle the word that "goes best with the picture." The test is designed to measure the pupil's ability to recognize or analyze isolated words. A time limit of fifteen minutes is allotted for the completion of the vocabulary subtest.

The comprehension subtest consists of thirty-four passages of increasing difficulty and length and is designed to measure the pupil's ability to read and understand connected language. Each item consists of a passage and a panel of four pictures. The child's task is to "mark with a big X the picture that answers the question or goes best with the story." Time for completion is set at twenty-five minutes. Q's pre- and post-test results on both subtests of the Gates-MacGinitie were as follows:

Pre-Test—September 1969—B Form-1

| Vocabulary | Comprehension |
|---|---|
| 13 correct items out of all the 48 test items answered. Grade Score—1.4 | 7 correct items out of all the 34 test items answered. Grade Score—1.4 |

Post-Test—May 1970—B Form—2

| Vocabulary | Comprehension |
|---|---|
| 7 correct items out of 34 test items answered. Grade Score—1.4 | 5 correct items out of 24 test items answered. Grade Score—1.2 |

*Analysis of Q's Gates-MacGinitie Reading Test Scores*

It was apparent, using Q's test scores as "benchmarks" of reading progress, that no quantitative progress was made. When Q's test responses were analyzed along the scale of key response, near key response, distant key response, very distant key response, which is described in Section 1 of Chapter III, some important dimensions of Q's test taking techniques were discovered. The following is an analysis of Q's responses on the Gates-MacGinitie Reading Test using the project's key scale:

*Analysis of Q's Vocabulary Responses Using Key Scale*

| | Number of Responses | | | | | Test Items | Test Items |
|---|---|---|---|---|---|---|---|
| | Key | Near Key | Distant | Very Distant | Omissions | Answ. | Total |
| Pre-test Vocabulary B Form-1 | 13 | 12 | 10 | 13 | — | 48 | 48 |
| Post-test Vocabulary B Form-2 | 17 | 13 | 3 | 6 | 9 | 39 | 48 |
| Pre-test Comp. B Form-1 | 7 | 11 | 9 | 7 | — | 34 | 34 |
| Post-test Comp. B Form-2 | 5 | 10 | 6 | 6 | 7 | 27 | 34 |

Q's practice of omitting test items in both post-tests was the most striking difference in his pre- and post-test performance. Q's previous response technique had been discarded for a more selective approach. The heightened selectivity of Q's response suggested the acquisition and use of phonic elements in reading that had not as yet emerged as behavior patterns of sufficient stability and flexibility for transference to other learning situations.

An examination of the individual responses of the two vocabulary tests for phonic patterns that predominated in Q's selection of responses indicated a larger number of different phonic patterns in his post-test performance. Initial consonant correspondence between the key response and Q's selected response seemed to be the pattern of most frequent occurrence in the pre-test. In the post-test, there was evidence that Q's selected responses compared with key responses of initial consonant correspondence, initial and final consonant correspondence and configurational correspondence. Although it was obvious that Q's use of multiple phonic elements did not always result in the selection of the key response, it did indicate Q's increased consciousness of the code-breaking nature of the reading process.

A number of Q's responses on both forms of the vocabulary test provided substantiation for the diagnosis of Q's visual perceptual difficulty based on his Diagnostic Test results. For this reason, the Visual Input channel was regarded as a less favored and comfortable system for reception than the Auditory and could not be considered a viable option for individualization of treatment. The decisions regarding taxonomic options formed previously from the Wepman and Diagnostic Reading Test data remained unmodified by the additional information from the Gates-MacGinitie. It was deemed impractical to await Q's acquisition of phonic skills before initiating instruction in comprehension skills. Therefore, the decision was made to introduce treatment as soon as possible with the following taxonomic components:

> 3 1 1 2 4 2 4 Basic Skill 3—Comprehension, Subskill 1—Main Ideas, Sequential Level 1—Grades 2 and Below, Instructional Setting 2—Student Self-Instruction, Instructional Mode 4—Test Response, Sensory Modality Input 2—Auditory, Sensory Modality Output 4—Motoric Response (circling, underlining).
> 3 2 1 2 4 2 4 The change is in the second digit of the treatment and specifies Subskill option 2—Details.

These treatments selected for the development of comprehension skills were only to be used for personalization of instruction because of the choice of option 2 of Instructional Setting—Student Self-Instruction. There was some doubt as to Q's self-containment ability within the Setting; consequently, the options of Sensory Modality Input 2—Auditory and Sequential Level 1—Grades 2 and Below were selected to minimize the effects of Instructional Setting 2—Student Self-Instruction.

During the course of diagnosis, analysis and decision making, many questions were raised as to why Q behaved in an expected-unsuitable manner, what relationship his behavior had to the preferentiality of the taxonomic components, where Q had fixated in his language and social development, in what order of priority the expected-unsuitable behaviors were to be listed for remediation and which elements of behavior needed to be preconditioned before unexpected-suitable and expected-suitable behaviors would be effected as residual increments. Eventually, from the question and answer period, there evolved a series of criteria, objectives and behaviors for which the instructional treatments for Q were developed. It has been noted in other parts of the manual that delineations of criteria, objectives and behaviors are by nature dynamic rather than static, the dynamism of the delineations being in direct proportion to the rate at which the pupil gains information and modifies his behavior patterns. Criteria have the longest "life expectancies" since they are statements of global purposes which are harder, therefore, to achieve. This should be kept in mind while reading the criteria, objectives and behaviors listed below that were put into effect at the initial stage of instructional treatment for Q.

*Criteria of Q's Instructional Treatment*

The ultimate effect of treatment should be the development of Q as a self-directed, autonomous person capable of manipulating conditions in his environment in an expected- or unexpected-suitable manner. Since adequate reading achievement is believed to be an essential component of the gestalt behavior sought above and is also the behavior of most direct concern to the Taxonomic Instruction Project, the second criterion was directed toward the development of Q's reading skills to the extent of his potential, the limits of which had not been assessed as yet.

*Objectives of Q's Instructional Treatment*

There were two sets of objectives, the first directed toward preconditioning those behavior patterns that would enable Q to attain autonomy and self-directedness. In light of these objectives, instructional treatment was aimed at modifying Q's behavior to effect self-containment patterns, suitable social patterns and a heightened self-image. The second set of objectives, with closer correspondence to the elevation of Q's reading ability, included the determination of preferential wavelengths for the enhancement of Q's reception of information, the improvement of Q's visual perception and the advancement of Q's aural perception of significant sounds in English.

*Behaviors to be Effected by Instructional Treatment*

The desired behaviors were dichotomized along the same line of distinction as the objectives. The first set of behaviors to be effected by treatment included the development of behavior patterns that would enable Q to function in Instructional Settings 1 and 2—Teacher-Student and Student Self-Instruction respectively, and the extension of these behavior patterns to aid Q in his manipulations of the variables in Instructional Mode 1—Play-Puzzle, 2—Play-Chance, 4—Test-Response and 7—Programmed Response. The second set of behaviors to be effected by treatment included recitation of the alphabet,

graphic reproduction of the alphabet letters in upper- and lower-case letters, association of phoneme to grapheme, storage of a sight word vocabulary and comprehension of main ideas and details.

In the next section of this case study, Q's behavior in selected instructional treatments for one week is described and evaluated. The stages through which treatment passes from experimentation through evaluation to practice, then to re-evaluation and, finally, to the formulation of a strategy for either individualization or personalization of instruction are an essential part of the descriptive account that follows. The treatments used for illustrative purposes are only a sampling of the population of instructional treatments and are used for both experimentation and practice in and out of the classroom environment.

**Treatment**

Date: October 20, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1433 |

Basic Skill 1—Cognitive-Perceptual, Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test-Response, Sensory Modality Input 3—Auditory-Kinesthetic, Sensory Modality Output 3—Vocal Response.

Description of Materials and Task: Both tutor and Q recited alphabet in unison while each simultaneously bounced a ball.

Objective: To develop the concept that each letter of the alphabet is an entity separable from all the other letters of the alphabet.

Anticipated Behavioral Outcome: Recitation of the alphabet letters in proper sequence.

Description of Q's Behavior: Q could not recite the alphabet sequence beyond the letter *F*. The tutor's assistance was necessary for the rest of the sequence although sequential segments such as *M N O* were known. The letters of these sequential segments were not clearly enunciated but rather were grouped and pronounced almost as one letter. There was much running after the ball. Q's eye-hand coordination was poor. A beach ball would be more appropriate to use than the small hand ball used today.

Evaluation: There was a high degree of engagement during the five trials of the treatment. Kinesthetic, option 1 of Sensory Modality Input, may prove to be the most preferential of all the options. The Teacher-Student Setting was very helpful in maintaining Q at the task. None of Q's behavior during the session could be judged as unsuitable with the exception of his ball bouncing.

Priority must be given to eye-hand coordination.

Decision: To continue experimental use of 1111423 with the nontaxonomic modification of substituting a beach ball for the hand ball that was used.

Date: October 20, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 121 | 1423 |

Basic Skill 1—Cognitive-Perceptual, Subskill 2—Memory Span, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test-Response, Sensory Modality Input 2—Auditory, Sensory Modality Output 3—Vocal Response.

Description of Materials and Task: Tutor presented a series of digits orally. Q listened to the series and upon completion of the last digit, orally reproduced the digits in the same sequence in which they were presented.

Objective: The development of auditory memory span.

Anticipated Behavioral Outcome: The oral reproduction of aurally presented sets of digits increasing in length from three to six in number.

Description of Q's Behavior: Q was highly motivated and fully engaged in the task. He demonstrated facility in orally reproducing number series up to and including six digits. Absolutely no tension was evident.

Evaluation: Q's behavior was unexpected-suitable. This treatment calls upon Q's strength and should be recorded as a model for individualization of instruction.

Priority should be given to determining if auditory memory with letters is as extensive as auditory memory with digits.

Decision: To continue experimental use of treatment 1211423, making nontaxonomic changes in the rate and grouping of digit presentation. Also, letters should be substituted for the digits.

Date: October 20, 1969

Location of Treatment: In the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 311 | 2424 |

Basic Skill 3—Comprehension, Subskill 1—Main Ideas, Sequential Level 1—Grades 2 and Below, Instructional Setting 2—Student Self-Instruction, Instructional Mode 4—Test Response, Sensory Modality Input 2—Auditory, Sensory Modality Output 4—Motoric Response (written—circling).

Description of Materials and Task: The material was a tape containing six short paragraphs with one question and three possible answers accompanying each paragraph. The same material in visual form was presented to Q. The tape informed Q that he could read along with the narrator or listen. He had to listen carefully because at the end of each paragraph was a question he would have to answer by circling one of the three choices offered. In order not to distract the other members of the class, Q wore earphones.

Objective: To develop listening and comprehension skills.

Anticipated Behavioral Outcome: To perform the task without the assistance of the teacher or tutor.

Description of Q's Behavior: Q was able to perform the task as prescribed without once calling for the teacher's assistance. He chose to listen to the tape rather than read along with the narrator. He demonstrated high engagement and was not distracted from the task by any of the other classroom activities. All of Q's six responses were correct. Q's behavior in the performance of the treatment can be characterized as unexpected-suitable.

Evaluation: Treatment 3112424 is another model of individualized instructional treatment and can be used to heighten Q's self-image.

Priority should be given to increasing the Sequential Level to option 2—Grades 2-4 in order to determine the level at which Q can aurally receive information without invalidating the individualized nature of the treatment.

Decision: To continue the use of 3112424 for individualization of instructional treatment in developing comprehension skills. To experiment with the Sequential Level of the treatment in order to determine the level at which personalization of instruction begins.

Date: October 21, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1433 |

See description October 20, 1969.

Description of Materials and Task: Same as October 20, 1969 with a beach ball substituted for the hand ball used at the first trial.

Objective: Same as October 20, 1969 plus the development of eye-hand coordination.

Anticipated Behavioral Outcome: Same as October 20, 1969, plus the bouncing of a beach ball with facility.

Description of Q's Behavior: Q demonstrated no improvement in reciting the alphabet throughout the first four trials. In the fifth trial, there was a breakthrough in which Q went through the sequence from *A* to *O* without error and with no prompting from the tutor. In addition, Q was able to manage the beach ball with ease.

Evaluation: Again, there was a high degree of engagement. There appears to be some confirming evidence of the efficacy of option 3—Auditory-Kinesthetic as an effective input channel for Q.

Priority is being given to graphic reproduction of the first part of the alphabet if Q, in the next session, repeats the alphabet from *A* to *O* without error.

Decision: To continue the practice of 1111433 for the development of oral reproduction of the alphabet sequence.

To initiate experimentation with 1111434, the same treatment as above, with a change in the Sensory Modality Output from 3—Vocal Response to 4—Motoric Response (writing the letters of the alphabet).

Date: October 21, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 121 | 1423 |

See October 20, 1969.

Description of Materials and Task: See October 20, 1969. Substitution of letters for digits.

Objective: The development of auditory memory.

Anticipated Behavioral Outcome: The oral reproduction of sets of letters increasing in length from three to six in number.

Description of Q's Behavior: Q was highly motivated, fully engaged in the task and demonstrated facility in orally reproducing letter series up to and including six letters. No tension was evident.

Evaluation: Q's behavior was unexpected-suitable. His auditory memory span with letters is as extensive as with digits. This treatment draws upon Q's strength and can be added to the reservoir of treatments for the individualization of instruction.

Priority should be given to determining the level of Q's performance when the task requires graphic reproduction of digits or letters.

Decision: To provide Q with opportunity to practice treatment 1211423 using letters, digits and combinations thereof.

To experiment with treatment 1211424 which represents taxonomic change from 3—Vocal Response to 4—Motoric Response (written) in the Sensory Modality Output category.

Date: October 21, 1969

Location of Treatment: In the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 312 | 2424 |

See October 20, 1969.
Both treatments are the same with the exception of the third digit, Sequential Level, which has been raised to option 2—Grades 2-4.

Description of Materials and Task: See October 20, 1969.

Objective: See October 20, 1969.

Anticipated Behavioral Outcome: See October 20, 1969.

Description of Q's Behavior: The up-grading of the Sequential Level effected no change in Q's behavior. He performed well, requiring little assistance from the teacher. There is evidence of stability of performance that may allow the reclassification of Q's behavior as expected-suitable rather than unexpected-suitable.

Evaluation: Treatment 3122424 is to supersede treatment 3112424 as a model of individualized instruction because it is evident that Q's listening vocabulary is higher than anticipated.

Priority should be given to increasing the Sequential Level to option 3—Grades 4-6 in order to determine the level at which Q can receive information through his auditory system in a Student Self-Instructional Setting.

Decision: To use treatment 3122424 for individualization of instruction in developing comprehension skills.

To experiment by increasing the Sequential Level of instructional treatment in order to determine the level at which personalization of instruction begins.

Date: October 22, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1433 |

See October 20, 1969.
Description of Materials and Task: See October 20, 1969 and October 21, 1969.

Objective: See October 20, 1969 and October 21, 1969.

Anticipated Behavioral Outcome: See October 20, 1969.

Description of Q's Behavior: From the third trial through the fifth, Q was able to recite the letters of the alphabet with no prompting from the tutor.

Evaluation: Q's degree of engagement remained high. Residual increments of learning have appeared.

Decision: To continue the practice of 1111433 for the purpose of "fixing" the oral reproduction of the alphabet.

Date: October 22, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1424 |

Basic Skill 1—Cognitive-Perceptual, Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test Response, Sensory Modality Input 2—Auditory (the sound of his own voice), Sensory Modality Output 4—Motoric Response (written).

Description of Materials and Task: Q was required to first say the name of the letters and then graphically reproduce the upper-case letters of the alphabet one at a time.

Objective: To develop the concept that each alphabet letter name can be represented by a grapheme.

Anticipated Behavioral Outcome: Reproduction of the alphabet letters in proper sequence.

Description of Q's Behavior: Q printed the letters from A through H correctly, then printed a lower-case *l* and reversed the letter *J*. From this point on, Q's behavior deteriorated rapidly. He threw his pencil away and banged his hand on the table, rocked back and forth on his stool. The tutor calmed Q by tracing letters on his back and asking, "What letter is it?" The pencil was retrieved and the task was resumed in this manner. Q's behavior was expected-unsuitable and his engagement very low.

Evaluation: Treatment 1111424 was initiated too quickly. The tutor was carried away by the success of the previous treatments.

Priority is given to the graphic reproduction of the alphabet using a Kinesthetic Input to assist Q in the task.

Decision: To discard 1111424 as personalized instruction and to replace it with 1111415.

Date: October 22, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 121 | 1424 |

Basic Skill 1—Cognitive-Perceptual, Subskill 2—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test Response, Sensory Modality Input 2—Auditory, Sensory Modality Output 4—Motoric Response (written).

Description of Materials and Task: Tutor was to present a series of letters orally. Q was to listen and upon the completion of the last letter, graphically reproduce the letters in the same sequence in which they were to be presented. The decision was made to cancel this treatment because of Q's inability to cope with the previous treatment of 1111424. Both treatments required Q to recall the visual shape of the letters, a task he was incapable of performing. Therefore, the tutor reverted to treatment 1211423 which Q had handled with ease on two previous occasions. 1211423 required only an oral reproduction of the series of letters presented by the tutor.

Description of Q's Behavior: Q was sulky at first and not as cooperative as usual. Finally, he overcame the effect of the inappropriate treatment and basked in the successful completion of the prescribed task.

Evaluation: None is needed. It appears that 1211423 heightens Q's self-image.

Priority is to develop Q's visual imagery of the grapheme which is the preconditional behavior pattern before the ability to graphically reproduce letters can be achieved.

Decision: To continue the practice of 1211423 and to discard the uses of 1211424 until Q is able to reproduce the letters of the alphabet from *A* to *Z*.

To experiment with treatment 1211443 to determine if Q's visual memory is as extensive as his auditory memory.

Date: October 22, 1969

Location of Treatment: In the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 313 | 2424 |

See October 20, 1969.
Both treatments are the same with the exception of the third digit, Sequential Level, in which an increase to option 3—Grades 4-6 was planned. The incident, precipitated by treatment 1111424, indicated the need to discard 3132424 and to revert to 3122424 which was regarded as a model of individualized treatment. The increase in Sequential Level to option 3—Grades 4-6 could cause a repetition of disordered behavior.

Description of Materials and Task: See October 20, 1969 and October 21, 1969.

Objective: See October 20, 1969.

Anticipated Behavioral Outcomes: See October 20, 1969.

Description of Q's Behavior: Expected-suitable.

Evaluation: Treatment 3122424 continues to be a model of individualized instruction that generates a high degree of engagement in Q.

Decision: To continue to use treatment 3122424 for individualization in developing comprehension skills.

To discard the plan to raise the Sequential Level of this treatment until Q has mastered the graphic reproduction of the alphabet. The frustration and tension from this task are all that Q can manage. This treatment with the raised Sequential Level can only be used if the other treatments scheduled for the same day have not precipitated disordered behavior.

Date: October 23, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1423 |

Basic Skill 1—Cognitive-Perceptual, Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test Response, Sensory Modality Input 2—Auditory (the sound of his own voice), Sensory Modality Output 3—Vocal.

Description of Materials and Task: Q was asked to recite the alphabet without bouncing the ball.

Objective: See October 20, 1969.

Anticipated Behavioral Outcome: Recitation of the alphabet without the triggering effect of the ball as it bounces on the floor.

Description of Q's Behavior: Excellent performance. Q had difficulty retrieving only three letters: *L*, *Q* and *Y*. By the third trial, Q gave a perfect performance.

Evaluation: There were substantial residual increments that accrued from the original treatment of 1111433. It appears that the Kinesthetic component can be discarded for the recitation of the alphabet.

Decision: To continue practicing the alphabet with treatment 1111423.

To experiment with 1111423 by changing the last digit to option 2—Motoric Response (gestures and movement), the movement in this case being the typing of the alphabet as it is recited.

Date: October 23, 1969

Location of Treatment: Out of the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1415 |

Basic Skill 1—Cognitive-Perceptual, Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test Response, Sensory Modality Input 1—Kinesthetic, Sensory Modality Output 5—Vocal-Motoric Response.

Description of Materials and Task: Tutor traced upper-case letters on Q's back; Q first said name of letter and then wrote it. Letters were done in alphabetical sequence.

Objective: To develop the concept that each alphabet letter name can be represented by a grapheme.

Anticipated Behavioral Modification: Reproduction of the alphabet letters in proper sequence.

Description of Q's Behavior: Q was able to reproduce the alphabet in this manner. After the tutor traced *A*, Q said, "I know the next one," then printed the upper-case letters through *I* but needed the tracing for *J* and *K*. Printed *L M N O P* without prompting; then for the rest of the sequence needed the additional information provided by tracing. There were no disordered behaviors. Engagement was high.

Evaluation: For this type of task, Kinesthetic Input remains preferential.

Decision: To continue treatment 1111415 for the graphic reproduction of the alphabetical sequence.

Date: October 23, 1969

Location of Treatment: Out of classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 121 | 1443 |

Basic Skill 1—Cognitive-Perceptual, Subskill 2—Memory Span, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test Response, Sensory Modality Input 4—Visual, Sensory Modality Output 3—Vocal Response.

Description of Materials and Task: Tutor flashed cards with series of digits. Card was

exposed for two seconds. Q was to repeat the digits in the sequence of presentation.

Objective: The development of visual memory span.

Anticipated Modification of Behavior: The oral reproduction of visually presented sets of digits increasing in length from three to six in number.

Description of Q's Behavior: Q was highly motivated and fully engaged in the task. There was no evidence of difficulty.

Evaluation: Q's behavior was unexpected-suitable. His visual memory span for numbers seems to be as extensive as his auditory memory span. In this particular task, the visual system seemed to be an effective channel for the reception of information. The question is whether the visual system would function as well if the stimuli were letters. It is premature to cite treatment 1211443 as a model for individualized treatment.

Decision: To continue Q's practice of 1211443.

To experiment with the treatment by changing the Sensory Modality Output to option 4—Motoric Response (written).

To experiment with the treatment by using the upper-case letters *A* through *H* in lieu of digits.

Date: October 24, 1969

Location of Treatment: Out of the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 111 | 1422 |

Basic Skill 1—Cognitive-Perceptual, Subskill 1—Symbolic Discrimination, Sequential Level 1—Grades 2 and Below, Instructional Setting 1—Teacher-Student, Instructional Mode 4—Test-Response, Sensory Modality Input 2—Auditory (the sound of his own voice), Sensory Modality Output 2—Motoric Response (typing).

Objective: To associate a grapheme with the names of the alphabet letters.

To assess the value of visual information in developing the association.

Anticipated Behavioral Outcomes: Recitation of the alphabet. Reproduction of the alphabet by typing.

Description of Q's Behavior: In each of the three trials, Q successfully recited the alphabet without any prompting from the tutor. Then he said the name of each letter and hunted for it on the keyboard. The tutor prompted by tracing the letter shape on Q's back when there was difficulty finding the letter. The tutor saw to it that Q made no mistakes. Q was delighted to type. Engagement could not have been higher. There was difficulty in persuading Q to make the transition to the next task. Again, Q's behavior can be characterized as unexpected-suitable, although his behavior at the termination of the task was expected-unsuitable.

Evaluation: Treatment 1111422 can be considered a model for individualized treatment. For the present, it appears that the novelty of the typewriter makes the reception of Visual Input preferential. The question is whether this preferentiality can be extended to less exciting visual stimuli.

Decision: To continue Q's practice of 1111422.

Date: October 24, 1969

Location of Treatment: Out of the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 121 | 1443 |

See October 23, 1969.

Description of Materials and Task: Tutor flashed cards with series of letters from *A* through *H* only. Card was exposed for two seconds. Q was to repeat the letters in the sequence of presentation.

Objective: The development of visual memory span.

Anticipated Behavioral Outcomes: The oral reproduction of visually presented sets of letters (*A* through *H*) increasing in length from three to six in number.

Description of Q's Behavior: Q performed the task with no difficulty. He seemed very pleased at his success.

Evaluation: Q's behavior was unexpected-suitable. His visual memory for letters seems to be as extensive as his auditory memory span. The question is whether the visual system would remain operable if the letters were not so well known to Q. It is still premature to cite treatment 1211443 as a model for individualized treatment. There is substantial evidence of residual increments in the association of graphemes with the names of letters, but it is believed that the Auditory-Kinesthetic Input system is the source of the residuals rather than the Visual Input system.

Decision: To continue Q's practice of 1211443.

To experiment with the treatment by changing the Sensory Modality Output to 4—Motoric Response (written) using digits only.

To experiment with the treatment by using less well-known upper-case letters in lieu of digits.

Date: October 24, 1969

Location of Treatment: In the classroom

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 313 | 2424 |

See October 20 and October 22, 1969.

Description of Materials and Task: See October 20, 1969.

Objective: See October 20, 1969.

Anticipated Behavioral Outcomes: See October 20, 1969.

Description of Q's Behavior: Q could not do the task without the assistance of the teacher. He raised his hand repeatedly and if the teacher did not respond quickly enough, Q called out angrily. His behavior retrogressed to an expected-unsuitable level.

Evaluation: The difficulty of Sequential Level 3—Grades 4-6 made the Instructional Setting 2—Student Self-Instruction inoperable. The question is whether Q could not actually do the task or whether his level of frustration is so low that it inhibits any effort to cope.

Decision: To discontinue the experimental use of 3132424.
To resume Q's practice with 3122424 for the time being.
To experiment with 3122424 by changing the second digit, Subskill 1—Main Ideas to Subskill 2—Details.

* * *

One week of taxonomic instruction for Q has been concluded. There remains the task of reviewing the details for the purpose of re-evaluating the impact of taxonomic instruction on Q's unsuitable habits. In the following paragraphs, each of the last four taxonomic components, as applied to Q in the development of strategies to enhance his reception of information, is subjected to re-evaluation within the framework of the project's coding system. The process of re-evaluation is to act as a force to integrate the new data collected from the observation of Q's interaction with the prescribed instructional treatments with the old data in order to form an operational structure from which to generate new strategies.

*Re-evaluation of Instructional Setting*

$A^P$—Accustomed-Preferred: Of the two Instructional Settings prescribed for Q, Teacher-Student and Student Self-Instruction, the former appears to be Q's preferred (most productive and most comfortable) Setting. Q basks in the attention of the teacher or tutor and strives to win approbation. There is every indication that Q is happier in the Teacher-Student Setting than in Student Self-Instruction.

The data shows that within certain limits, Student Self-Instruction is an operable Setting for Q's instructional treatment. Both the teacher and tutor feel intuitively that Student Self-Instruction is analogous to Q's environmental setting outside the school. Conditions in his home environment have conditioned Q to solitary learning. Therefore, Student Self-Instruction can be considered Q's accustomed Instructional Setting. To some extent, this line of reasoning provides the explanation for the unexpected-suitable behavior patterns effected in Q by Student Self-Instruction.

S–Stable: The Teacher-Student Setting has stability because, under most conditions, it repeatedly leads to expected-suitable behavior. Sensory Modality Input, option 4–Visual seems to be the taxonomic variable in instructional treatment that inhibits the effectiveness of the Teacher-Student Setting. Or, there is the possibility that the nature of the content is the inhibitory factor. This question requires investigation before the role of either of these taxonomic variables can be verified.

Student Self-Instruction is also stable in that it contributes to the production of expected-suitable behavior in Q. Again, there is evidence of an inhibitory factor. But in this case, there is no doubt that an increase in Sequential Level caused Q's deterioration of behavior since Sequential Level was the only taxonomic component that was being manipulated throughout the use of this treatment.

$S^F$–Stable-Flexible: Of the two Settings, Teacher-Student is viewed as the more flexible. Its effect on Q seems to allow for greater experimentation than Student Self-Instruction. It may be that the teacher's presence neutralizes some of the negative effects of the other taxonomic components in the instructional treatment.

$S^C$–Stable-Closed: Student Self-Instruction appears to be a stable-closed Setting. But the "closedness" of Student Self-Instruction may be more apparent than real as Q has used only one instructional treatment in this Setting. Further experimentation with this Setting is necessary before the evaluation of stable-closed can be confirmed.

$T^E$–Transition-Emergent: Student Self-Instruction, under very limited conditions, is emerging as a Setting for the personalization of instruction.

Both Settings, under specific conditions, have emerged as Settings for individualization.

P–Priority: The priority is to move Q in the direction of social interaction with his peers. For this purpose, Q will be prescribed treatments that contain option 3–Student-Student (Parallel) as the Instructional Setting.

The second order of priority is to determine the extent to which both Settings can be used for individualization of treatment. This priority necessitates a systematic manipulation of taxonomic variables in order to be able to designate the Modes, Inputs, Outputs, Basic Skills, Subskills and Sequential Levels that disrupt the effects of the two Settings.

*Re-evaluation of Instructional Mode*

Only one Instructional Mode, option 4–Test-Response has been used in all the instructional treatments designed for Q, although three other Modes, 7–Programmed Response, 1–Play-Puzzle and 3–Play-Chance, were selected as alternative options. Manipulation of options was restricted to the six other divisions of the Taxonomy. Therefore, there is no opportunity to evaluate Test-Response effects on Q in comparison with the possible effects of the alternative options.

$A^P$–Accustomed-Preferred: Since Test-Response does not appear to be the taxonomic variable that effected the few instances of disruptive behavior in Q, Test-Response may be Q's accustomed-preferred Instructional Mode. Refinement of this designation must await the

collection of data from Q's reaction to the three other Modes selected for Q's treatment.

S–Stable: There is considerable evidence that Test-Response is a stable Mode because it has generally contributed to a high level of engagement and has effected residual increments.

$S^F$–Stable-Flexible: Test-Response is also characterized by flexibility since its contributory effect in developing high engagement is evident in combination with a variety of options from the other taxonomic divisions.

$S^C$–Stable-Closed: In contradiction to the above characterization of stable-flexible, Test-Response is viewed also as a Mode with a high degree of "closedness." The "closedness" is seen as an inherent characteristic of the Mode itself which demands a preciseness of response of the participant that precludes expansiveness of thought.

$T^E$–Transition-Emergent: Since Test-Response was the only Instructional Mode used in Q's instructional treatments, no other option has had the opportunity to emerge as an alternative to Test-Response. In the course of Q's schooling prior to his exposure to taxonomic instructional treatments, Q must have had some conditioning to Test-Response as a mode of learning. Therefore, Test-Response did not pass through a transitional stage but was emergent from the beginning of taxonomic instruction as an Instructional Mode for the individualization of instruction.

P–Priority: Priority is given to determining the effectiveness of the alternative Modes, particularly option 1–Play-Puzzle and option 2–Play-Chance, for individualization of instruction. This priority is consonant with the priority that was set for Instructional Setting wherein Q is to be moved in the direction of social interaction with his peers. The nature of Play-Puzzle and Play-Chance lend themselves to socialized Instructional Settings.

*Re-evaluation of Sensory Modality Input*

Four Sensory Modality Input channels have been used in Q's instructional treatments: Kinesthetic-Auditory, Auditory-Kinesthetic and Visual. Therefore, re-evaluation of Sensory Modality Input includes comparative assessments of the effectiveness of these Inputs for both individualizing instructional treatment and generating high engagement levels.

$A^P$–Accustomed-Preferred: ,There is consensus among those who have worked with Q that Auditory and Visual are Q's accustomed input channels, although it is also recognized that neither of these channels are preferential. Q's adjustment to these channels, though inadequate, is probably due to conditions in his previous schooling which normally would have emphasized the auditory and visual modalities. Use of Kinesthesia for the reception of information is rare in elementary instruction. Of the two Inputs, Visual and Auditory, the latter seems to be more preferred by Q than the former.

The Kinesthetic option is regarded as Q's preferred Input. Since the Kinesthetic channel is a singularly unsophisticated system, its carrying capacity is restricted. Therefore, to elevate both the quantity and quality of the received messages, an auditory component was added to Q's preferential input modality.

S–Stable: Three of the input options, Kinesthetic, Auditory-Kinesthetic and Auditory, can be regarded as stable systems within the limited usages to which they have been put. The

Visual Input is not at all stable. Or in assessing Visual Input for the quality of stability, it is preferable to say that the dimensions that may make for a stable Visual Input have not been determined as yet.

$S^F$—Stable-Flexible: Both Kinesthetic and Auditory-Kinesthetic seem to allow for the expansion of Q's repertoire of skills and informational bank. The flexibility of Auditory Input cannot be assessed since treatment was restricted to known content until the session when the Sequential Level was elevated to the point that regressive behavior was evoked. This set the limit to the content that could be used but offers no evidence that the Auditory channel is not practicable when used with other contents within limits set by the level of acceptable difficulty.

$S^C$—Stable-Closed: Since information received through the Kinesthetic and Auditory-Kinesthetic channels was retained by Q, it can be said that the channels represent stable-closed systems. This characterization of the two systems is supported by evidence of residual increments in learning. At this time, there is insufficient data to evaluate the degree of "closedness" that may result from the too extensive use of these input channels.

$T^E$—Transition-Emergent: As yet, there is no evidence that any of the channels are in a transitional stage leading to improvement or regression of reception.

P—Priority: There are two priorities for this taxonomic category. The first is to schedule the Visual Input on a regular basis for Q's instructional treatment. The second is to establish the limits of the Kinesthetic, Auditory and Auditory-Kinesthetic Inputs in relationship to the other taxonomic variables.

*Re-evaluation of Sensory Modality Output*

Two output options have been used for Q's treatment: Vocal Response and Motoric Response (marking).

$A^P$—Accustomed-Preferred: Although oral communication appears to be Q's preferred system, it is really the output channel to which Q has become accustomed. Q's level of oral expression is primitive and minimal. It is apparent that Q restricts his oral communication with others in order to conceal his speech impediment. On the other hand, the motoric output may actually be Q's channel of preference. The care with which Q formed his letters and wrote his name during testing suggests that there may be aesthetic pleasure in writing for Q.

S—Stability: At very minimal levels, both output systems are stable. It is anticipated that undue pressure to express himself orally would cause regression in Q's oral behavior. There has been some evidence of this regressive pattern during the week's instructional sessions.

$S^C$—Stable-Closed: Q's oral output is closed in the sense that Q does not have the inner resources with which to elevate and expand his level of functioning. On the other hand, Q has been able to move from simple motoric tasks of circling and underlining to the more complex motor task of typing the alphabet. Therefore, the Motoric channel may be the flexible expressive system for Q.

$T^E$—Transition-Emergent: Of the two systems, Motoric Output may be in a period of transition to emerge in the near future as a channel operating at a higher level of complexity.

P—Priority: The priority is to develop Q's Motoric Output through tasks that require a sequence of Motoric Output followed by Oral Output. The Motoric to Oral Output sequence may possibly lead to the reverse pattern of Oral to Motoric which would elevate the level of Q's oral expression.

Important decisions affecting the continuance of instructional treatment for Q were made during the process of re-evaluation. Most important of all, the decision was the designation of these *Hows* of instruction as individualized treatment: 1433 when coupled with Cognitive-Perceptual content, 1423 as applied to letters and digits and 2424 in developing comprehension. During the second week of instruction, the experimental use of the three *Hows* with other contents is expected to yield data confirming their effectiveness in enhancing Q's reception of many different kinds of messages. If what is anticipated is also realized, the three *Hows* of instructional treatment will have achieved full status as strategies.

## CASE STUDY—L

L is a slim, well built boy of thirteen years. He has no apparent physical defects. He is generally in good health. L was born in Brooklyn, New York into an English-speaking family of six boys and seven girls. The father is the sole support. L's mother and father are aware of their son's disturbed behavior and are concerned and cooperative with the school's administration. L is presently in the sixth grade and has shown disruptive behavior by disobeying rules, starting fights with other students, bullying the other children, showing hostility toward authority figures, destroying his work and the work of other students, using profane language frequently, running around the classroom while making weird sounds, stealing money from a cookie container in the teacher's desk and giving it to classmates, crawling under the desks and annoying other students and exhibiting other behaviors unacceptable in the school setting. There have been three incidents in which L has taken packs of candy that were put away by parent volunteers. L denied taking the candy but described the boy who did take the candy and what kind of candy it was.

In his previous school, L was extremely disruptive in and out of the classroom. He would ring classmates' doorbells on his way to school and make a nuisance of himself. In the class, he would take the children's pennies, pencils, crayons and other items. His previous principal placed him in a citizenship class but L failed to make an adjustment. The principal and guidance staff suggested a shorter day would be beneficial for L. Accordingly, he was placed on one-half day session. L's placement in a citizenship class and his shortened school day were the result of a five day suspension and a referral to the Bureau of Child Guidance for individual counseling. At this time, L was also referred to Queens General Hospital. "No improvement" was recorded on his records.

His suspension from school was precipitated by the following incident, reported by a music teacher in his school:

> On Monday, January 13, I went to class _____ to give a music lesson. Several children were racing about the room as I entered. They continued to chase about even after Mrs. _____ left. I very firmly insisted that these children take their seats. They did so.
>
> L, however, when he sat down, immediately took a book from his desk and by gestures and mean looks, was threatening to throw it at me. I kept my eyes on him not daring to look away so that I might avoid being hit by the book.
>
> Finally, after some minutes, he threw the book hard but behind him, not at me. He then fished around in his desk and came up with a piece of broken, jagged pocket mirror. He proceeded to imply by gestures and facial grimaces that he was going to slash my face and throat.
>
> He continued to thrash his arms about, still wielding the piece of glass in a very menacing manner. At this point, I became concerned not only for myself, but for L himself and for the other children seated nearby. I state very frankly that I was afraid to approach him in any attempt to remove the glass from his hand.
>
> I called the office to ask for help. Fortunately help arrived very quickly thereafter.

In L's gym class, L ran around the gym and would not listen to his instructor. L would hang from the chains around the window bars or hang upside down on the chinning bar. With his classmates, L would push the other boys in the yard and on the stairs. His gym teacher commented: "While children were playing in a relay race, he was throwing his toy

car out on the floor where children were playing. This could have caused a bad accident. He insisted and persisted in this behavior after being told to stop."

In his other classes, his teachers and the assistant principal remarked that he walked around the room with the sharp edge of a pair of scissors toward people, hit girls, wrote with chalk on the overhead projector while it was in use, walked around the room and knocked things down. In the words of a teacher:

> L seems to get a great deal of satisfaction out of hurting others. He'll hit his classmates for looking at him, passing his desk, getting better marks, etc. He'll always give some reason for striking a person.
> Everyday he brings toys or a big bag of food. When he has the food, he starts his meal immediately upon entering the room. If the food or toys are taken away, he throws his other belongings on the floor and yells. . ."You had better give it back. I'm going to come up and get my things. You have no right to take my things," etc.
> Whenever he is given paper for an assignment, he finds something wrong with it; asks for another piece; starts the assignment in his notebook or he starts destroying something in his desk or near him. If I don't keep an eye on him, he deliberately destroys the reading games.
> Whenever I go out of the room on my prep period, he leaves the room and runs all over the building. He has told me on many occasions that he doesn't have to follow the rules at school.
> He has been taken off the free lunch list because he refuses to listen to the school aides and teachers during the lunch hour.
> On January 12, L brought an expensive watch to school which he says he found in the street. He broke it into pieces.

The common denominator was that L did not have any self-control or any sense of social containment. The Bureau of Child Guidance commented:

> L has presented a learning and behavior problem since kindergarten. He seems to have no motivation to learn. He is very destructive. He scribbles on his paper, then tears it up. He has taken crayons, pencils and money from other children. He has taken money out of the teacher's desk drawer. In the second grade, he took $20 out of a teacher's wallet. He runs around the room hitting children. He throws crayons across the room as well as airplanes and spitballs. He answers back. . . .He speaks in a hostile manner. He lies often. He does not get along with his peers either individually or in groups. He fights with them and annoys them.

In the incident described above in which L took $20 from a teacher's wallet, L met the counselor in the hall and showed him the $20 bill. He told the counselor that the money was given to him by his brothers. Later, the teacher informed the counselor that the money was missing from her wallet. The counselor stated: "When L was told that the teacher was missing the $20, he immediately said another boy in the class took the money and gave it to him." L's mother was called in to school by the counselor. The mother wanted to investigate who took the money, her son or the other boy. She said that her husband would tend to L when he returns home from work.

This background and behavior led to L's referral to a "600" school. L was officially

admitted to P.S. 9 in September of 1968. The Bureau of Child Guidance examined him at that time. Their remarks were as follows:

*Personality*

Toward other pupils—aggressive, hostile, initiates fights
Toward those younger or smaller—sometimes protective
Toward those older or larger—aggressive, fighting
Toward authority figures—demanding, attention seeking, defiant, hostile

In addition, the Bureau of Child Guidance commented that L's extracurricular status showed neither work experience nor participation in any outside activities. L seemed to have no hobbies and no camp experience. However, he did use the neighborhood after-school play center.

One of his teachers at P.S. 9 went to the guidance office and reported that L was trembling and seemed to be in shock. The teacher said that L was beaten severely at home. The guidance counselor spoke to L for over an hour. During that time, L told the guidance counselor that his father wanted him to tell the school people about the beating. Apparently, the mother behaved emotionally and struck out with a stick and beat the children. L feared his mother. His father wanted to come into the school and talk because he felt his wife was mentally ill. The guidance counselor made an appointment with his father. Also, the guidance counselor advised the teacher to remain closely involved with L so that the boy could express himself to someone.

L is an extremely nervous child. This nervousness manifested itself in overactivity. One teacher commented that he had to leave the room at least five times a day. Another teacher commented that L had many responsibilities at home, some of which include: cooking, cleaning and dishwashing. Still another teacher commented that he was often very poorly dressed and that his hyperactivity got him into a great deal of mischief.

Except for the first grade where L missed forty-two days, his attendance at school has been fair. He was, however, often late to school. This tardiness usually ranged from one-half hour to one hour.

## Diagnostic Battery

The Taxonomic Instruction Project staff administered three diagnostic tests to L since his referral in September of 1968. These three diagnostic instruments were 1) The Wepman Auditory Discrimination Test, 2) The Taxonomic Instruction Project Diagnostic Reading Test, and 3) The Gates-MacGinitie Reading Test.

### *Wepman Auditory Discrimination Test*

The reader is referred to Chapter III for the procedure for administering the test. The purpose here is to analyze test results and make tentative hypotheses as to the appropriateness of instruction. Both Forms I and II were given to L each academic year. Form I was administered at the beginning of the school year and Form II at the end of the school year. L's test results were as follows:

| | Form I | | Form II | |
|---|---|---|---|---|
| | X Score | Y Score | X Score | Y Score |
| Pre-Test September 1968 | 5/30 | 0/10 | | |
| Post-Test May 1969 | | | 4/30 | 0/10 |
| Pre-Test September 1969 | 3/30 | 0/10 | | |
| Post-Test May 1970 | | | 2/30 | 0/10 |

All the errors were contained in the X Score part of the test. This meant that errors were made only with pairs of words in which consonants or vowels were different in an initial, medial or final position. No errors were made in the Y Score part of the test in which the word pairs were identical.

*Analysis*

Pre-Test September 1968 showed the five errors to include:

| | |
|---|---|
| shake — shape | final consonant |
| dim — din | final consonant |
| clothe — clove | final consonant |
| shoal — shawl | medial vowel |
| pen — pin | medial vowel |

Post-Test May 1969 showed the four errors to include:

| | |
|---|---|
| sake — shake | initial consonant |
| lass — lath | final consonant |
| cope — coke | final consonant |
| lave — lathe | final consonant |

Pre-Test September 1969 showed the three errors to include:

| | |
|---|---|
| coast — toast | initial consonant |
| clothe — clove | final consonant |
| pen — pin | medial vowel |

Post-Test May 1970 showed the two errors to include:

| | |
|---|---|
| cope — coke | final consonant |
| wreath — reef | final consonant |

The item breakdown of the Wepman Auditory Discrimination Test has the following components:

10 Word Pairs having no change (Y Score on Test)
30 Word Pairs having some change (X Score on Test)
4 Word Pairs contain a medial vowel change
13 Word Pairs contain an initial consonant change
13 Word Pairs contain a final consonant change

L showed nine errors in word pairs with a final consonant change, three errors with vowels in medial word position and two errors in pairs of words with an initial consonant change.

*Taxonomic Instruction Project's Diagnostic Reading Test*

Only the first four sections of the test which covered the basic phonic knowledge and skills were given. This was done since L's reading ability indicated that the other sections of the test would be too difficult.

Section I consisted of giving the names and sounds of the following consonants:

Section I

1. */ b t c k v n y r x q z d f g h j s w m p*
2. */ b t c k v n y r z d f g h j s w m p*

Since there is no alternate form of this test, the student received the identical test at the beginning and end of each academic year. His results were as follows:

| | Names of Letters | Sounds of Letters |
|---|---|---|
| Pre-Test September 1968 | All Correct | Did not know *g* |
| Post-Test May 1969 | All Correct | Did not know *g* and *y* |
| Pre-Test September 1969 | All Correct | Did not know *y* |
| Post-Test May 1970 | All Correct | Did not know *y* |

In the first testing session, L did not attempt to pronounce the letter *g* and went on to the next letter on the test. On the second test, he pronounced the letter *y* using the sound /wa/. On the third test, the letter *y* elicited the same /wa/ sound. On the last trial, L responded with the sound of long *i* for the letter *y*.

Section II

This section consisted of giving the names and sounds of the vowels.

1. *a e i o u*
2. *a e i o u*
3. *a e i o u*
4. *ĭ ŭ ĕ ŏ ă*
5. *ē ō ī ā ū*

For line one, L was asked to give the names of the five letters. For all four trials there were no errors. For line two, L was asked to give the short vowel sounds. The results were as follows:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | Knew only short *a* |
| Post-Test May 1969 | — | Knew only short *a* and *e* |
| Pre-Test September 1969 | — | Knew only short *a* |
| Post-Test May 1970 | — | Knew all the short vowel sounds |

For line three, L was required to give the long sounds of the vowels. The results were as follows:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | No correct responses |
| Post-Test May 1969 | — | No correct responses |
| Pre-Test September 1969 | — | Knew only the long *e* sound |
| Post-Test May 1970 | — | Knew all the long vowel sounds |

For line four, the tester gave the short vowel sounds and the student was required to point to the appropriate letter on the stimulus card. The results were as follows:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | No correct responses |
| Post-Test May 1969 | — | Two correct responses—short *a* and *o* |
| Pre-Test September 1969 | — | All correct responses |
| Post-Test May 1970 | — | All correct responses |

For line five, the tester gave the long vowel sounds shown and the student was required to point to the appropriate letter on the stimulus card. L obtained perfect scores on every test trial. This was not surprising since the long vowel sounds are identical to their names.

## Section III

Section III of the Taxonomic Instruction Project's Diagnostic Test incorporated the most commonly used consonant blends and digraphs. They are given below:

*st cl ch fr gr tw th sm wh pl*
*bl sw sh br dr fl tr sn sp*

L's scores are shown below:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | Knew only *ch, th* and *sh* |
| Post-Test May 1969 | — | Knew 16 blends and digraphs, did not know *cl, sh* and *fl* |
| Pre-Test September 1969 | — | Knew 8 blends and digraphs, did not know *cl, ch, tw, sm, wh, pl, bl, sw, sh, fl* and *sn* |
| Post-Test May 1970 | — | Knew 9 blends and digraphs, did not know *sn, tr, fl, sh, sw, bl, pl, th, tw* and *cl* |

It is interesting to note that at the end of the academic year 1969, L knew 16 blends and digraphs. Then something happened over the summer, for his pre-test for the following academic year indicates that he knew only half that number. By the end of the 1969-1970 school year, L was still not functioning as well as he had been a year earlier.

## Section IV

The last section administered to L required him to reproduce the alphabet in sequential order, first using upper case letters and then using lower case letters. The results were:

| | Upper Case Letters | Lower Case Letters |
|---|---|---|
| Pre-Test September 1968 | All Correct | Did not know *f* |
| Post-Test May 1969 | All Correct | Did not know *u*<br>Used Upper Case *F* |
| Pre-Test September 1969 | All Correct | All Correct |
| Post-Test May 1970 | All Correct | All Correct |

*Gates-MacGinitie Reading Test*

The last test in the battery was a formal reading test consisting of two subtests, vocabulary and comprehension. The Gates-MacGinitie Reading Test was given at the beginning and end of each academic year. There are two alternate forms of this test. The vocabulary subtest consists of 48 items. Each item has a drawing of an object. Next to the drawing are four words. Only one of the words goes best with the drawn object. The student is required to circle the word which goes best with the drawing. The comprehension subtest requires the student to read a short selection which ranges in length from a simple sentence to a small paragraph. Then the student is to select the one drawing of the four above the reading selection that best describes what was read. L's results were as follows:

| | B Form 1 | B Form 2 |
|---|---|---|
| Pre-Test September 1968 | | Vocabulary - 21 items correct out of 40 items attempted.<br>Grade Score 1.7<br><br>Comprehension - 11 items correct out of 27 items attempted.<br>Grade Score 1.6 |
| Post-Test May 1969 | Vocabulary - 19 items correct out of 25 items attempted.<br>Grade Score 1.6<br><br>Comprehension - 13 items correct out of 19 items attempted.<br>Grade Score 1.8 | |
| Pre-Test September 1969 | Vocabulary - 23 items correct out of 42 items attempted.<br>Grade Score 1.9 | |

| B Form 1 | B Form 2 |
|---|---|
| Comprehension - 8 items correct out of 13 items attempted. Grade Score 1.4 | |
| Post-Test May 1970 | Vocabulary - 22 items correct out of 48 items attempted. Grade Score 1.8 |
| | Comprehension - 18 items correct out of 34 items attempted. Grade Score 2.4 |

*Analysis of Gates-MacGinitie Reading Test*

Guessing does not seem to be part of L's test taking technique. The first time he took the test, he completed 40 items on the vocabulary part and left 8 items blank, while in the comprehension part he completed 27 items and left 7 blank. The second testing showed that L finished 25 vocabulary items and left 23 items blank while in the comprehension part he completed 19 items and left 15 blank. The third testing showed that L finished 42 vocabulary items, leaving 6 blank while in the comprehension he finished 13 items and left 21 items blank. The final testing showed that L finished all the covabulary and comprehension items.

What is evident is L's development of the ability to complete the sequence of attaining greater amounts of work under identical time and testing limitations. Furthermore, it seems apparent that L uses minimal phonic clues, especially in final position change. The reader will recall the analysis of the Wepman Auditory Discrimination Test which showed a similar pattern. For example, in the Gates-MacGinitie Reading Test, L circled the word *hatch* for the drawing showing a *hatchet* and he circled the word *indeed* for the drawing showing an *Indian.* The emerging pattern seems to indicate that L's strengths lie in his aural and visual perception of the beginning of words. Therefore, instruction began at this point.

The identical pattern seems to be true regarding the comprehension part of the test. L would read the first part of the sentence or paragraph and then decide which drawing went best with what he had read. In many items, the last part of the reading selection contained the crucial information for selecting the correct answer.

A great deal of information was obtained from the previous battery of tests. All the information derived from this test battery, however, is only a fraction of the "data bank" on any student. Other sources of information come from the student's cumulative files, teacher-student conferences and daily observations.

Using all the information, the teacher raised a series of questions on L's academic and behavioral patterns. Some of these questions were:

**Questions Raised**

1. Why can't L work alone?
2. Why does L always need to work with his teacher?
3. Why can't he work in a large group?

4. Why can't he work in a small group?
5. Why can't he work with one other student?
6. Why does he annoy other students who are working?
7. Why does he need constant attention?
8. What can be done to help him work by himself?
9. What are his psychological needs?
10. What are his cognitive needs?
11. Which of L's behavioral patterns require preconditioning?
12. Are his behavioral patterns suitable or unsuitable for learning? Are they expected or unexpected?
13. What are L's developmental needs?
14. How can his emotional needs be met?

The questions that are raised in the course of analyzing L's performance are not randomly selected but are generated from the "data bank" that is available on the student. Question 1: *Why can't L work alone?* and question 8: *What can be done to help him work by himself?* are good examples to show the basis for decisions. After evaluating all the information on L, the teacher has decided that L must learn to work by himself. This is a common style of effort that all persons must become adapted to in situations beyond the school environs. Therefore, the decision was made to help L work by himself.

Other decisions were made based on other questions. Some of these decisions were that L eventually be able to work with one other student, in a small group, and in a large group. However, the central concern here was that L be able to work individually. Strategies were aimed at modifying the social rather than the academic behaviors exhibited by L since he lacked self-control and the ability to contain himself in all Instructional Settings other than the one of Teacher-Student.

The teacher felt that the *What* of instruction, the content, was not a crucial variable: L seemed to be able to work on any content with an appropriate Sequential Level if it was in a Teacher-Student Setting. He was individualized as far as content was concerned. The trouble arose when the *How* of instruction, specifically the Instructional Setting, did not satisfy L's psychological and social needs. Therefore, priority for L's instructional treatment was given to the development of self-containment and social control in all Settings but Teacher-Student.

L was individualized only when he worked in a Teacher-Student Setting. Any other Setting frustrated him to some degree. The teacher experimented in order to find the strategy or strategies that would enable L to accommodate himself to Instructional Settings other than Teacher-Student. This experimentation was conducted over a period of several weeks and is recorded in the pages that follow.

**Treatment**

Date: Monday, January 19, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 352 | 1444 | *Using the Context A* |

L loved to work on a one-to-one basis. He also liked using the workbook, *Using The Context A*, but did not want to work on *Locating The Answers A*. He used only the former for the first session. L had a good phonic approach to new words but had

trouble with inflectional endings, namely, -s and -ed. The suffix -s was not always pronounced, both in the use of plural nouns and third person singular verbs. Reversal confusion was apparent in the words *three* and *there*. Letter discrimination was apparent in the words *house* and *horse*.

On the syntactic level, L omitted prepositions in prepositional phrases, e.g., he would read *the table* for *on the table*, etc.

These problems were pointed out to L. In the course of this one lesson, improvement was seen.

Date: Tuesday, January 20, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 352 | 2444 | *Using the Context A* |

Today L began to work by himself. Although he has a tendency to stop work and daydream, his work showed one error in five exercises. The material (content) seems to be well chosen for L.

The words *cold* and *could* gave L some trouble. He shows good initial and final phonic skills but loses the middle of words.

Date: Friday, January 23, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 352 | 2441 | *Using The Context A* |

L took quite a long time before he started to work today. He was busy selling a small laughing machine toy to another student for seventy-five cents.

The teacher believes that part of his trouble getting started came about because he had just returned from shop and was now on a milk and cookie break.

Once he got started, however, he worked steadily. He needed teacher help with only one word, *umbrella*, and did well on all the exercises.

L will finish the workbook he is working in today. Next week, L will begin to work with two other pupils on a new content.

Date: Tuesday, January 27, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 221 | 6255 | *Junior Phonic Rummy* |

Three boys, including L, played *Junior Phonic Rummy*. This game teaches the short vowel sounds. L had no trouble isolating the sounds from the picture cards–*ă* for *cat*, *ĕ* for *bed*, *ĭ* for *fish*, *ŏ* for *top*, *ŭ* for *duck*. He learned the rules but tried to cheat several times by taking extra cards and extra turns.

When the other boys won hands, L began to rebel and got angry at them and the teacher. Although he wanted to play again, he was beginning to lose his self-containment.

Date: Wednesday, January 28, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 221 | 6255 | *Junior Phonic Rummy* |

L absolutely could not play *Junior Phonic Rummy* with two other boys, even though he won one hand out of three. He refused to follow the rules of the game and provoked the other boys by constantly cheating. His peers told him to play the game according to the rules. He was reminded by the teacher to lower his voice when he argued with his peers. He continued to argue with the other boys. When the teacher intervened, L denied any and all charges made against him and left the group to go to another part of the room, where he sulked and began to sew a school emblem on his jacket. The two boys continued to play the game while L remained at his desk sewing.

Later in the day, after lunch, L came into the Materials Resource Room and stated to the staff that he did not want to return to his classroom. One staff member talked to him and then L returned to the classroom.

Date: Friday, January 30, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 322 | 42/374 | *Uncle Wiggley* (game) |

L, another boy and the teacher played the *Uncle Wiggley* game. This game requires the child to move his marker from one point to the end on a board with intervening reading instructions along the way.

The game contained L even though he was not winning. L tried to gain steps by moving his marker more than the required number of steps; this cheating was stopped by the teacher.

The period ended before the game was finished and L was contained throughout, even though the teacher was winning and L trailing the other student.

*Summary–January 19 to January 30, 1970*

L's preferred method of working is in the framework of a one-to-one setting. He is able to contain himself longer in this setting than working individually, with a student, or with a large or small group. It seems apparent that L needs teacher reinforcement and attention.

Armed with adequate phonic skills, L can work individually but becomes erratic, i.e., he stops and daydreams or stops to talk to other students.

One of the most obvious characteristics L demonstrates is that he cannot successfully work in a small group using a Play-Chance Mode. His reaction to such a situation indicates the he loses his self-control and as a result rebels. It is interesting to note, however, that L can work in a Small Group Setting only if the teacher is part of that group.

One of L's persistent exigencies is his need for individual attention to satisfy his social and psychological demands.

Date: Thursday, February 5, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 221 | 6255 | *Junior Phonic Rummy* |
| 321 | 1465 | *Locating The Answer A* |

L is gaining more self-control in a Small Group Setting. After five games of *Junior Phonic Rummy* (he won only one game), L left. However, his tolerance was much longer today than ever. He followed the rules and was relatively quiet. Toward the end of the fourth game, L began to lose some of his control and started to bother the other students playing.

After the fifth game, L began another activity. This activity dealt with comprehension exercises identifying details and was in a Teacher-Student Setting.

Although L had previously behaved well in this Setting, he needed to be constantly urged by the teacher. After several minutes of talking about himself and his interests, L became involved in the activity.

During the lesson, L achieved his highest index of engagement.

Date: Friday, February 6, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 221 | 6255 | *Junior Phonic Rummy* |

L began working well in a small group but left when his peers told him he was cheating. The teacher came to settle the argument and requested a new deal. L refused and returned to his desk to sulk. The teacher tried to get L to return but without success.

Date: Tuesday, February 10, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 221 | 6255 | *Junior Phonic Rummy* |
| 321 | 1465 | *Locating The Answer A* |

Today L worked in a small group with a Play-Chance Mode for about 10 minutes and then began to fight. For the rest of the period, the teacher isolated him and they worked together in his workbook, *Locating the Answer A*. L even refused to work on a Teacher-Student basis.

The teacher feels that L might do well on an individual basis using the tape recorder. Hopefully, the tape recorder will, in effect, be a teacher substitute. L is to read the exercises from his workbook and tape his voice while reading. Then L is to answer the questions at the end of each selection.

Date: Tuesday, February 17, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 321 | 4465 | *Locating The Answer A* |
| 321 | 2465 | *Locating The Answer A* |

In order to engage L, the teacher decided to let him work with one other student. Both L and the other student took turns reading the exercise selected from their books into a tape recorder. Afterwards they listened to the taped stories as they followed in their books.

Toward the middle of the period, the other student left L and began a new activity while L continued the same activity. Although L began to play around with the tape recorder by making a variety of noises, the activity (with teacher supervision) held his interest and he seemed to enjoy his lesson.

*Summary–February 5 to February 17, 1970*

Although L is gaining more self-containment in a Small Group Setting, he still prefers and works better in a one-to-one setting.

More observation and experimentation is needed to determine the effect of L working in a Student Self-Instruction Setting with an Auditory Input. The teacher is planning instruction accordingly.

Date: Tuesday, February 24, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 322 | 1465 | *Getting The Facts B* |

L was unreceptive and did not want to work when the teacher began to work with him in a Teacher-Student Setting. Some introductory small talk was needed in order for L to unwind and ready himself to receive instruction. The talk was about what L did over the weekend, what movies he saw and what television programs he enjoyed. L was then mentally prepared to work in his workbook. The instructional period went well and L did not show signs of frustration or boredom. The teacher alternated reading the story selection with L. All questions were answered correctly. L enjoys working on a one-to-one basis and desperately needs this type of Instructional Mode.

Date: Wednesday, February 25, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 322 | 2465 | *Getting The Facts B* |
| 322 | 1465 | *Getting The Facts B* |

L was again put on individual instruction but after ten minutes could not function in this setting. Even though his task was explained precisely, L could not continue on his own. When the teacher sat with him, L could do the task with minimal teacher assistance.

Date: Monday, March 2, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 321 | 1465 | *Locating The Answer A* |
| 322 | 1465 | *Getting The Facts B* |
| 322 | 2444 | *Getting The Facts B* |

L had no problems working with the teacher in either book. However, when he worked alone, he could not continue. When the teacher asked him why he could not work alone, L said that he did not know how to read many of the words. The teacher told L to start a new story and write all the words he did not know on a sheet of paper. When this was done, the teacher and L went over all the words that L could not read. Then L was told to reread the story and answer the multiple-choice questions. This strategy began to work, but more experimentation is needed.

Date: Wednesday, March 11, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 322 | 2444 | *Getting The Facts B* |

L was asked to write down on a separate sheet of paper any and all words he could not read so that he and the teacher could review those words before L reread the selection and answered the questions. Unfortunately, L could not even do this alone and so the strategy failed.

The next step was to pre-record on *Language Master* cards those words which the teacher felt L could not read and then have L play those words when the need arose. In this way, L would be working on an individual basis with minimal teacher help.

The teacher feels strongly that L can read the majority of words but does not make any effort to do so when he works alone. Perhaps this new approach will be successful. The plan to use the pre-recorded words will be implemented at the next session.

Date: Thursday, March 12, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 322 | 2441 | *Getting The Facts B* |
| 322 | 2461 | *Words on Language Master cards* |
| 322 | 2444 | *Getting The Facts B* |

L was told that if he did not know a word, he was to go to the *Language Master* card on which the word was printed and listen to it. Then, after hearing the word, he was to continue the reading selection until he came to another word he did not know. The process was to be repeated until the reading selection was finished.

This strategy contained L for the entire period and results showed that L answered five out of eight multiple-choice questions correctly. The teacher believes that L can do better than this because L seemed to like this activity very much. The teacher feels that this strategy will be successful. However, more observation and experimentation is needed.

*Summary—February 14 to March 12, 1970*

A pattern of noninvolvement and moodiness is still apparent. Introductory small talk about nonacademic subjects is needed in these situations. A Teacher-Student Setting is the preferential need for L. However, although he needs a one-to-one relationship for instruction, the emerging trend shows minimal teacher assistance rather than constant teacher assistance.

L's stable level is becoming more flexible, that is, his behavior in working individually is not as closed as it once was. He can be pre-taught difficult words and then do the prescribed readings on his own. A *Language Master* was finally used to pre-teach words before L read his selection and the strategy contained him for the duration of the instructional period.

This was the first time that L successfully contained himself for an entire instructional period without the teacher by his side.

Perhaps the last sentence should be repeated: **This was the first time that L successfully contained himself for an entire instructional period without the teacher by his side.** The experimentation to find a strategy for L yielded a residual increment (success). This success continued over time; therefore, a strategy was created for L. The experimentation led to practice which led to further experimentation which led to further practice which effected residual increments. Thus, a strategy to enhance L's reception of information has evolved through a decision making process.

This strategy was the result of decisions made as a result of questions asked. In order to answer these questions, evidence came from diagnostic information, experimentation, daily observations and the student's cumulative file. The selection of a strategy on the part of the teacher led to an awareness of outcomes. These outcomes led to the modifications of inputs. When decisions were made about final outcomes, the results were strategies. As was stated in Chapter I: "A strategy is formed when a student, over a period of time, continues to be engaged in instruction, and when the teacher can choose that strategy and have assurance that the student will respond in an expected fashion."

Use of this strategy effected appropriate behavior in L. He began to work by himself; he was able to contain himself in the instructional setting; he developed a greater degree of social control; and he began to enjoy school. However, other strategies will need to be developed to answer the other questions raised in this case study.

## CASE STUDY—D

*BACKGROUND*

D is a fifth grade student who was transferred to P.S. 9, a special school for emotionally disturbed, socially maladjusted students in late November of the 1969-1970 school year. At the time of the transfer, he was 10 years, 4 months of age. The immediate causes for the transfer included the following incidents: 1) the student persisted in climbing on top of the wardrobe closet; 2) he frequently left the room and ran around the halls; 3) he allegedly "waylaid" a girl; 4) he became enraged in the classroom and threw furniture, books and blocks; and 5) he struck the teacher. D's cumulative file indicated that these incidents were symptoms of a deteriorating pattern of behavior that had begun earlier in his life.

His problems in school began in the first grade. Although his behavior was satisfactory at that time, he had great difficulty with reading and arithmetic, and as a result, he had to repeat the first grade. From that point on, his behavior became worse. He refused to do assignments; and he had great difficulty getting along with his peers, causing fights both in the classroom and during lunch. Outside of school, his behavior was even more uncontrollable; for example, he could not go home on the bus because of the problems he caused for the other children and the driver.

By April 1968, D's behavior was such that it was necessary to have him tested by a child guidance clinic. The clinic report concluded as follows:

> We found no evidence of organicity or psychosis. Intellectually, D tests in the low average range but his potential seems a bit higher, perhaps in the middle average level. We find in him symptoms of loneliness, depression, impulsiveness, and at times, severe disorganization, in part due to his moods. His problems appear to be reactive ones.

Following the testing, D was placed in a junior guidance class in the elementary school. These classes are designed for students with special problems, and D's disruptiveness made his placement in such a class logical. Junior guidance classes are small in the hope that greater attention and a specialized curriculum will help to remediate the difficulties of the students.

The special class was an unsuccessful experience for D; he continued to be hyperactive and abusive towards the teacher and students, both in and out of the class. In addition to his behavioral problems, D began to threaten suicide. For all of these reasons, he was placed in a state mental hospital for two months in the spring of 1969.

While at the hospital, D apparently became better adjusted; the hospital report indicated that he had begun to function with his peers. D was also given reading and arithmetic tests at the hospital. The results indicated that he was functioning at a 2.3 level in reading and a 1.5 level in arithmetic. The general recommendation of the hospital staff was a highly structured program with constant supervision. Because of the difficulty in doing this in a regular class as well as D's failure to function in a junior guidance class, it was recommended that he be transferred to a special school for emotionally disturbed, socially maladjusted boys. The recommendation was accepted, and late in November 1969, D began attending the special school.

## Diagnostic Battery

Although D's cumulative file contains much information pertinent to behavioral problems, there is little information pertaining to his specific abilities in reading. To gain more information about his functioning level, an attempt was made to administer the three diagnostic instruments used by the staff of the Taxonomic Instruction Project, i.e., the Wepman Auditory Discrimination Test; the Taxonomic Instruction Project's Diagnostic Reading Test; and the Gates-MacGinitie Reading Test.

None of these tests, administered in December 1969, yielded the information for which they were designed. In each case, D either refused to take the test and simply sat in his chair, or refused to take the test and began to wander aimlessly around the room, stopping from time to time to play with something that caught his eye. He was not antagonistic; he simply would not let the tests be administered.

Relying on the limited information in the cumulative file because of D's difficulty in taking the tests, a judgment was made that D was reading somewhere at the first or second grade level. Because of his extreme hyperactivity in the testing room, additional information relevant to his behavior in the classroom was gathered. His behavior in the classroom corroborated observations in the test situation and information from the cumulative file. D refused to perform reading tasks, becoming either antagonistic or apathetic depending on how the teacher handled his refusal. Also, he behaved like a gadfly; for example, he would fall to the floor and claim someone hit him, throw objects at other students, or participate in pointed bantering that would lead to fights.

Basically, the selection of instructional treatments revolved around the reality of the situation. D was disruptive in the class and was continuing to exhibit behavior similar to his behavior previous to placement in the special school. The ultimate goal was to engage him in reading tasks which would lead to his self-control in a classroom setting. The following are reports of the taxonomic treatments that were used in the attempt to reach that goal.

### Treatment

Dates: January 12-16, 1970

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 221 | 2744 |

Material Used: Programmed Reader

*Reason For The Treatment*

It was decided that the *What* of the taxonomic treatment should include material that was probably known to D. This had to be a guess, since D had refused to take any of the diagnostic tests that were available. The 221 code indicated that D was to participate in a Language Analysis Basic Skill dealing with the Vowel Subskill on Sequential Level, Grades 2 and Below. It was hoped that the student would be able to handle this material which consisted of dealing with the vowel sounds of simple words, since, at this point in the treatment, it was felt that material that was too difficult would create unnecessary tension in D.

The *How* of the treatment 2744 indicated that D would be working in the Instructional Setting of Student Self-Instruction, with a Programmed Response Instructional

Mode, with a Visual Sensory Modality Input and a Motoric Sensory Modality Output. The Instructional Setting seemed obvious, since D's behavior had shown that he was consistently causing problems when working with other students. It was hoped that he could function in a setting where the distractions of other students could be kept to a minimum. Likewise, the Programmed Response Instructional Mode was chosen since it would provide the most immediate feedback for D, and hypothetically would lead to the least frustration.

*Observation Of The Treatment*

The format for the programmed material was explained to D; consequently, he began using the material during the reading period. He was observed during four consecutive class sessions and was able to contain himself quite well for the duration of these periods. He received a minimal amount of attention from the teacher during the sessions and seemed content to work silently by himself. The only negative aspects that were apparent in the treatment were the brief periods of time during which D would put his head in his arms and sleep.

*Evaluation Of The Treatment*

Both D's teacher and the taxonomic staff were surprised by the rapidity with which D had begun functioning in the class. In fact, D's performance was so dissimilar to his previous behavior that it was decided to administer a brief test to determine whether D was in fact doing the work or only going through the motions.

This test was developed and administered during the fifth day of the taxonomic treatment. It was apparent that D had not been following the programmed format of the material; seemingly he was interested in finishing the workbook and simply would copy the answers, a possibility with a programmed workbook. As a result, he was simply filling pages with answers and not actually following the suggested procedures. When he was asked in an informal way to name key vocabulary words, he was unable to do so.

The information that was gained from the informal testing session was discussed with the teacher in order to revise the prescription being used with D. Following are the changes that were made: Basic Skill 2—Language Analysis was changed to Basic Skill 3—Comprehension. This change was made in part because the teacher had noticed that D did not seem to like working with vowels. He felt this material was "babyish." And, despite the lack of objective evidence indicating a basic sight vocabulary, the teacher felt that D could work with simple paragraphs. Consequently, the Basic Skill 3—Comprehension and Basic Subskill 2—Details became part of the instructional treatment. The Sequential Level remained the same—Grades 2 and Below. Therefore, the *What* of Instruction changed from 221 to 321.

The prescription for the *How* of instruction, 2744, also was changed in the light of D's performance in the classroom. Although Instructional Setting 2—Student Self-Instruction had engaged the student, D appeared to have difficulty in following the directions in the material. However, it was felt that Student Self-Instruction could be modified somewhat to include more of a Teacher-Student element, i.e., D would continue in the Student Self-Instruction Setting, but the teacher would make an effort to use the Teacher-Student Setting whenever possible.

The Instructional Mode of Programmed Response seemed to put too much pressure on D to perform. Also, because of its sequential nature, this Mode seemed to act as a goad that spurred D to finish as quickly as possible. These factors were hypothetically the ones that contributed to D's cheating; consequently, the new prescription included Test-Response

rather than Programmed Response as the Instructional Mode, Test-Response being a Mode that allowed a closer check on D's performance and a clearer picture of how well he was doing with particular vocabulary items.

The Sensory Modality Input and Sensory Modality Output remained the same, i.e., Visual Input and Motoric Output (marking and writing), respectively.

In summary, the treatment changed in the following manner:

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| 1st treatment: | 221 | 2744 |
| 2nd treatment: | 321 | 2444 |

Work with the revised prescription began on Tuesday of the following week.

Dates: January 20-22, 1970

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 321 | 2444 |

Material Used: *Following Directions, Book A.*

*Description Of The Material*

*Following Directions, Book A* contains a series of exercises consisting of four pictures followed by four questions dealing with the pictures. To do the exercises, the student must know the vocabulary words included in the directions, as well as understand the task that is involved.

*Observation Of The Treatment*

D continued to be engaged during the reading period. Apparently, he knew most of the words in the exercise, since he did not require much assistance from the teacher. He seemed driven to complete the book, a task he completed in two class sessions. Also, he was getting the correct answers in the exercises in the book and seemed capable of reading the brief questions and following the directions. Generally, he was quite pleased that he was doing so well.

*Evaluation Of The Treatment*

As with the programmed material, D's engagement was high; he was able to attend to the task for the entire reading period. In addition, he was able to do so with a minimum of teacher assistance. Unlike the programmed textbook, however, D was not able to "cheat" in the Test-Response Mode; he had to understand the material in order to get the correct answer. Apparently, the Student Self-Instruction Setting, coupled with material that he could understand, was sufficient to lead to engagement.

D's engagement in the reading task was such that two evaluating sessions were held with him outside of the classroom. The first of these was to examine the general question of why D had done so well in *Following Directions, Book A.* During the session, which was

held in the staff conference room, the question was presented to D. In effect, he said that he "liked the way the book was laid out," which seemed to indicate that he liked the Test-Response Mode of answering short questions in the exercises.

To examine whether D actually knew the vocabulary words in the book, a selection of words was chosen and typed on individual cards. D had great difficulty identifying the words; even the simplest words gave him trouble. At one point, he picked up the book and leafed through it to find a picture that would help him identify the word. This led to the suspicion that he had not really read the book but had used some sort of picture cue to do the exercise. To check this out, the pictures in the book were covered. D was still able to do the exercises.

Two explanations for D's difficulty with the isolated vocabulary words seemed plausible: either he could not label words that were out of context, or too much pressure was generated when he was faced with a single word. This pressure, in turn, led to his inability to label the word, while in fact, he knew it and could identify it in context.

The aspect of pressure seemed to be a key. D had refused, and continued to refuse, to take standard reading tests. Also, he seemed to be able to function best in a Student Self-Instruction Setting which was essentially free of pressure. To obtain more information, a second evaluation session was held with D, again in the staff conference room. During this session, D was given a workbook comparable to *Following Directions, Book A*. The situation was made competitive by telling him that he had thirty seconds to do each assignment, and that he should try to "beat the clock." This completely frustrated D; he became angry and refused to do the work. He was then told that he could do the assignments as slowly as he wanted to. He then did six assignments very quickly, each one taking from 17 to 25 seconds to complete, and got correct answers on all of the items.

The results of these evaluative sessions were discussed in conference with D's teacher. It was apparent that D could do the work in *Following Directions, Book A*. The ease with which he did this, in spite of his difficulties with the words in isolation, led to the decision to use *Following Directions, Book B* in the reading period. This book had the same format as *Following Directions, Book A*, except for a slightly more difficult vocabulary. However, the vocabulary was not so difficult as to warrant moving to Sequential Level 2.

Also, it was decided that the reading period should be as free of pressure as possible for D; he should be allowed to work on his own with minimal interaction with other students.

Accordingly, the third taxonomic treatment remained the same as the second, the only change being that D would be working in a slightly more difficult book.

Dates: January 26 - February 6, 1970

| Instructional Treatment: | WHAT | HOW |
|---|---|---|
| | 321 | 2444 |

Material Used: *Following Directions, Book B*

*Observation of the Treatment*

During the reading periods in which D was using *Following Directions, Book B*, his behavior showed a regression from that exhibited while using *Following Directions, Book A*. Typically he would do one of two things: 1) if he did not know a word, or could not read a question, he would clamor for the teacher's attention; once this was gained, he was very

unwilling to give it up and had difficulty continuing if the teacher left him; 2) if he had difficulty, he would stop work and sulk for the entire reading period.

On the positive side, during one reading lesson, D was observed as being engaged for the entire instructional time. The critical factors here seemed to be that the teacher gave him a large amount of attention and was able to answer any questions D posed. It was apparent that D could do the work in *Following Directions, Book B* if he received sufficient attention from the teacher.

*Evaluation Of The Treatment*

The move from *Following Directions, Book A* to *Following Directions, Book B* did not seem to warrant D's regression in behavior, since the formats of the two books were similar and the vocabulary in *Book B* was not much more difficult than in *Book A*. Apparently, however, the vocabulary was difficult enough to create frustration for D, a fact which led to a deterioration in behavior and increased reliance on the teacher for assistance. In effect, D's frustration led to a self-generated need for a switch from the Setting of Individual Self-Instruction to the Setting of Teacher-Student; if this switch was not made by the teacher, D would cease to be engaged.

It was felt that the instructional treatment could be changed in the following three ways: 1) the level of difficulty of the materials could be changed to an extremely simple level in order to remove any chance of material frustration for D; 2) the instructional treatment could be changed to include the Instructional Setting of Teacher-Student rather than Student Self-Instruction; and 3) other components of the treatment could be changed in order to find a previously untried engaging treatment.

The first alternative was discarded because D had shown he could handle the material in *Following Directions, Book B*. The problem did not seem to be the difficulty level of the material. The second alternative was also discarded as a formal instructional treatment, since it was physically impossible for the teacher to be ready constantly to assist D, even though such attention was likely to lead to engagement.

The third alternative was chosen, after which the information that had become available on D was analyzed to find clues that would assist in formulating the new instructional treatment. Of primary importance was the desire to retain Student Self-Instruction as the Instructional Setting but to modify it in such a way as to include aspects of instruction that would obviate the continual presence of the teacher.

Observation of D's interests gave a clue as to the next step in instructional treatment. During discussions with him, he would often get up and wander rather aimlessly around the room. Usually, however, he stopped to play with machines, such as typewriters, tape recorders, etc. This seemed to indicate a fascination with the mechanics of how things worked. Because of this fascination, the following instructional treatments were devised:

| WHAT | HOW |
|---|---|
| 231 | 2463 |
| 321 | 2444 |

The treatment was operationalized by using a Language Master, a recording device on which words could be taped and presented auditorally at the same time as they were presented visually. D was to use the Language Master in two ways, as reflected by the two instructional treatments. In the first instructional treatment, 2312463, the Language Master was to be used in vocabulary building. All the words from a selection of words in *Getting*

*the Facts, Book B* were printed and recorded on Language Master cards; D was to simultaneously look at and listen to a word, then look at the word and record his label. Before moving on to the exercises in *Book B*, D had to show that he could label correctly most of the words from a particular exercise.

The second instructional treatment, 3212444, was concerned with D's work with *Book B*. If he had difficulty with a word, he was to find it on the Language Master cards and listen to the correct label. It was hoped that this type of instructional treatment would allow D to work autonomously in the Student Self-Instruction Setting. The following reports D's functioning with the above instructional treatments:

Dates: Treatment started on February 11, 1970

| Instructional Treatments: | WHAT | HOW |
|---|---|---|
| 1st Treatment: | 231 | 2463 (Language Master) |
| 2nd Treatment: | 321 | 2444 (*Following Directions, Book B*) |

*Observations Of The Treatment*

D began work in a conference room, since the extent of the directions made it difficult for them to be given in the classroom. D reacted positively to the outline of what he was to do and seemed to understand the tasks.

Initially, D went through an extended period of familiarization with the Language Master. He seemed fascinated that he could run a card through a machine, say anything he wanted and then immediately play it back. Much of the time he simply made sounds and played them back to see how he sounded.

The familiarization process lasted for one entire session. During the second session, D began to work on the 2312463 treatment. He immediately discarded a number of words he knew (words such as *the* or *and*). With more difficult words, he followed the suggested procedures, first listening to and looking at the words, then attempting to label correctly the word when it was presented visually.

D had reached a suitable proficiency level after two sessions of vocabulary development. This was not too surprising, since, on at least one occasion, he had shown that *Following Directions, Book B* was not too difficult. During the next session, he began working in the workbook. He was able to do the exercise with some ease, having to use the Language Master for assistance on only three vocabulary words. Generally, he seemed to enjoy the tasks and remained engaged throughout.

The above procedure was repeated a second time outside of the classroom, and again D's performance was expected-suitable; he developed an adequate familiarity with the vocabulary items and was then able to do the appropriate lesson in *Following Directions, Book B*. Since it was felt that D had enough familiarity with the format of the tasks, an attempt was made to begin the treatments in the classroom.

D's use of the Language Master in the classroom was marginally successful. On the positive side, there were lessons during which he remained engaged for the entire period of instruction. During these periods, he would work either on the vocabulary development portion of the lesson or complete the appropriate assignment in the workbook.

However, on the negative side, D's gadfly behavior in the class continued. At times, in the eyes of the rest of the class, he would be overbearing in his use of the Language Master;

he would downgrade other students who were not using one and this would lead to such antagonism that other students would make it a point of not allowing D to function. For these reasons, D continued to work in the 2312463 and 3212444 treatments outside of, as well as in, the classroom. Outside of the classroom, he continued to be engaged; in the classroom, at times he was engaged, at other things, disengaged.

*Summary of D's Performance*

Prior to the beginning of the treatments, D had shown behavior that was expected-unsuitable; his aggressiveness and inability to function in the class were characteristic. The initial treatment, 2212744, was successful in engaging D; his behavior then became unexpected-suitable. He functioned adequately in the treatment, but the suddenness of the behavior transformation made it unexpected. As the treatment was evaluated, the necessity for certain changes became apparent; therefore, the new instructional treatment, 3212444, was devised.

Again, D's performance was adequate; he became engaged in the instructional treatment. Accordingly, he remained in the 3212444 treatment, this time with a slightly more difficult book. Apparently, this book was just difficult enough to frustrate D, since his behavior became unexpected-unsuitable and he tried to move out of the Student Self-Instruction Setting into the Teacher-Student Setting.

It was possible that the difficulty in engaging D stemmed from the inappropriateness of the *What* of instruction, the first three digits of the instructional treatment. This was unlikely, however, since D had shown that he could do the work in *Following Directions, Book B.* However, to satisfy both possibilities, a double treatment was then prescribed for D, first 2312463 and then 3212444. The first treatment was in the Basic Skill area of Language Analysis and encompassed the Vocabulary Subskill; the second was in the Basic Skill area of Comprehension and encompassed the Basic Subskill of Reading for Details. In other words, changes were made in both the *What* and *How* areas of instruction.

This double treatment was only partially successful. D was engaged when separated from the classroom; on the other hand, within the classroom, disengagement and the concomitant disruptive behavior was at times evident. Therefore, a strategy had been found for D, but one which was successful only when the distractions of the classroom were eliminated.

The instructional treatments, as described above, continued for the remainder of the school year. In addition, personalization of instruction began in April, two months before the end of the school year. It was felt that D had gained self-confidence over the course of the treatments in that his strengths had been demonstrated to him. It was now necessary to expose him slowly to situations in which he would have difficulty functioning in the hope that he would eventually be able to function successfully within the classroom setting.

D's maladapted behavior in the classroom stemmed primarily from his difficulties in functioning with the other students, as well as his difficulties in self-containment. He continued to show expected-unsuitable aggressiveness and antagonism toward others in the classroom. It was felt that if D could learn to function more adequately with other students, he might have more consistent success with reading instruction. Consequently, a long range series of instructional treatments was developed to assist D in practicing social control. This practice consisted of reading games to be played during the last period every Thursday morning. Instruction during these games was personalized for D, i.e., he was asked to function in situations that hitherto had been uncomfortable.

The following instructional treatment was used:

| WHAT | HOW |
|---|---|
| 211 | 6343 |

The *What* of the treatment dealt with the sounds of consonants. The *How* of the treatment was composed of the Student-Small Group Setting, the Play-Competition Mode, the Visual Sensory Modality Input and the Vocal Sensory Modality Output. The task consisted of playing one of two games with two or three students. The first game followed the format of Monopoly; each player in turn would throw a die and move a marker that indicated the number of spaces toward the goal. To keep from returning to "Go," the beginning sound of the picture on which the marker landed had to be given; once the goal had been reached, all of the consonant sounds had to be given to win.

D played these games every Thursday for two months. Following are three observations that are representative of D's performance: the first is the observation of D during the very first treatment session; the second is an indication of D's performance after he had been playing the games for approximately one month; and the third indicates D's performance at the end of the year.

*Observation 1.*

D was observed as he played the monopoly game. He did well for approximately fifteen minutes. At that point, he gave the wrong beginning consonant sound for a picture and had to go back to "Go." He became furious, threw down his marker and refused to play. A few minutes later, he went over to a group playing the card game and began playing with them. After five minutes, he accused a boy of cheating, became very angry and went back to his seat, where he sulked for the rest of the period.

*Observation 2.*

Again, D was observed playing the monopoly game. He had difficulty beginning, since he took another boy's marker and insisted he have that color. He had to be told to give the marker back. Then he insisted that he roll the die first, grabbed the die and refused to give it up until everyone agreed. This the other players refused to do. The situation was straightened out when numbers were drawn from a box to see who was to go first.

D's performance during the game was good. He had no difficulty with the tasks and won the second round. There was much bantering during the game, but it never got out of hand. D was engaged in the task for approximately thirty minutes.

*Observation 3.*

Again, D was observed playing the monopoly game. There was no difficulty at the beginning, nor for approximately thirty-five minutes. At that point, for no apparent reason, D became angry and refused to continue. After a few minutes, he went to his seat, where he remained until lunch time.

*Summary of D's Performance with the Games*

By the end of the year, D's performance in the instructional treatment 2116343 had improved; he was able to participate and interact with other students in the Setting of Student-Small Group and Mode of Play-Competition. However, this performance was not

entirely consistent; as indicated in the final observation, D continued to have times in which he would refuse to participate. The indication for further taxonomic treatments was that 2116343 should continue and be expanded to include other Instructional Modes, such as Problem Solving, in order to give D practice in functioning in a variety of situations.

**Recapitulation**

D's general performance over the months during which he received instruction indicated that two strategies had been found that were consistently successful, i.e., 2312463 and 3212444. However, these were only successful if D was out of the classroom environment. As such, they were not functional treatments for the teacher. At the same time, D had shown an improvement in social control in the 2116343 treatment. The suggested direction seems to be a continuation and expansion of this treatment over a number of months, accompanied by further experimentation with the hope of improving D's self-containment while in the classroom.

## CASE STUDY—A

A is extremely small for his age of fourteen. At present, he is living with his mother and four sisters; his father's address is unknown. He is in the eighth grade but is reading below third grade level. In addition to this reading deficit, A has social and psychological problems which are illustrated by the following anecdotes of a fifth grade teacher:

> A usually sits with one leg tucked under him at his desk. When he encounters any frustration, he will start to slide under his desk or get up and hop in a crouched position around the room whimpering.
>
> A helped to clean up the art room today. He enjoyed this privilege a great deal; however, when told that all the work was completed, he ran behind the art easel, curled up in the pre-natal position, and hid. When told a second time to get up, he said I am not here. Finally, I started to pick him up. He got up himself and began whimpering again.
>
> When entering the art room today, he flapped his arms as if to fly into his seat.

Reports such as the above led to A's admission to P.S. 9. In a psychologist's report in January of 1967, it was stated:

> A comes to P.S. 9 with an exhaustive dossier which seems to document a bizarre and aberrant patterning since entrance into school . . .
>
> At P.S. 9, A has been found to be immature and somewhat silly sometimes, as when he told a teacher he had just swallowed a turtle. (He literally rolled with laughter when he mentioned this.) Also, his regular teacher reports little learning and an impression of retardation.
>
> A pleasant faced, emotionally "open" boy, small in terms of self-defense potentialities, he obtained an I.Q. of 81 on the WISC Verbal Scale . . . however, it was noted that there is an average score on the items related to abstract reasoning. The impression of at least normal intelligence is confirmed by the PPVT I.Q. of 104 and the I.Q. of 102 on both the Goodenough and the Goodenough-Harris Draw-A-Man Tests.
>
> Projective tests suggest no pathology. They appear to confirm at least average intelligence. They suggest an insecure child with a high fantasy level, imaginative rather than bizarre. He is very anxious to be accepted and liked, but rather than projecting on the world his inadequacies in the interpersonal realm he is engaged in a search for inner resources. In view of the missing father, it is understandable that the male figure is a fantasy subject, offering potential satisfaction of deprived dependency needs and having the effeminate qualities he sees in the only adult he is familiar with—the mother.

The guidance counselor commented that A's inability to progress academically was due to very early emotional and physical deprivation. In addition, he believed that there was a blockage which prevented A from retaining information and learning to read. Some of his

remarks indicated that:

> A is . . . rather immature and requires intensive help in all academic areas.
>
> A's motor coordination is good and he doesn't appear to have any brain or neurological dysfunction or damage.

One of his teachers at P.S. 9 commented:

> A is a non-reader and is very backward in all the other academic areas. He has difficulty in controlling his impulses to act out. His adjustment difficulties in a school setting are severe.

Another teacher commented:

> A's behavior is extremely immature. This is manifested in many ways: baby talk, finger sucking, walking on all fours, lack of self-control, frequent need to go to boys room, etc.
>
> After a full term of individual and group help in reading, he shows no progress. A's reading ability was too low to be tested by the Metropolitan Achievement Test in reading (elementary). He has had intensive work in word analysis and sight vocabulary skills; however, his recognition of words is limited to configuration.
>
> A requires the use of the "ten frame" to do simple arithmetic.
>
> His work in social studies and science seems to indicate inability in simple analysis and reasoning.
>
> He is having difficulty in getting along with the other boys in his class. He has frequent fights and quarrels with the other boys.

### Diagnostic Battery

The three diagnostic tests used by the project's staff were administered to A. These included the pre- and post-tests of the Wepman Auditory Discrimination Test, the Taxonomic Instruction Project's Diagnostic Reading Test and the Gates-MacGinitie Reading Test.

#### *Wepman Auditory Discrimination Test*

The reader is referred to Chapter III for details of the administration of this test. The purpose here is to analyze test results and to make a tentative hypothesis as to the appropriate type of instruction. Both Forms I and II were given to A for each academic year. Form I was given at the beginning of each school year and Form II at the completion of each school year. The test scores were as follows:

| | Form I | | Form II | |
|---|---|---|---|---|
| | X Score | Y Score | X Score | Y Score |
| Pre-Test September 1968 | 4/30 | 0/10 | | |
| Post-Test May 1969 | | | 3/30 | 0/10 |
| Pre-Test September 1969 | 2/30 | 0/10 | | |
| Post-Test May 1970 | | | 1/30 | 0/10 |

Errors made in the "X Score" section of the test deal with pairs of words that were different in an initial consonant, medial vowel, or final consonant position. The "Y Score" section of the test deals with pairs of words that are identical. Since no errors were made in this section, it can be assumed that A was able to hear phonemic distinctions. The analysis of the "X Score" is as follows:

Pre-Test 1968 showed the four errors to include:

| | |
|---|---|
| web - wed | final consonant |
| dim - din | final consonant |
| clōthe - clōve | final consonant |
| pen - pin | medial vowel |

Post-Test 1969 showed the three errors to include:

| | |
|---|---|
| cad - cab | final consonant |
| lāve - lāthe | final consonant |
| wreath - reef | final consonant |

Pre-Test 1969 showed the two errors to include:

| | |
|---|---|
| sheaf - sheath | final consonant |
| lease - leash | final consonant |

Post-Test 1970 showed the one error to include:

| | |
|---|---|
| vie - thy | initial consonant |

The item analysis of the Wepman Auditory Discrimination Test has the following breakdown:

10 Word Pairs having no change (Y Score)

30 Word Pairs having some change (X Score)
- 4 Word Pairs contain a medial vowel change
- 13 Word Pairs contain an initial consonant change
- 13 Word Pairs contain a final consonant change

A showed eight errors in final consonant position, one error in medial vowel position and one error in initial consonant position. This indicated more difficulty relatively with final consonant sounds.

*Taxonomic Instruction Project's Diagnostic Reading Test*

Only the initial four sections which covered basic phonic knowledge and skills were given. The results were as follows:

Section I

Section I consisted of giving the names and sounds of all the consonants except *x* and *q*. A's results were as follows:

| | Names of Letters | Sounds of Letters |
|---|---|---|
| Pre-Test May 1968 | Did not know *d* | Did not know: *j, s, d, y, m, l, t, y, n, f, h* |
| Post-Test September 1969 | All Correct | Did not know: *d, v, n, y, j* |
| Pre-Test May 1969 | Did not know: *n* and *d* | Did not know: *d, v, n, y, r, j* |
| Post-Test September 1970 | All Correct | Did not know: *v, y, j* |

A never mastered the sounds for the letters *v, y,* and *j*. His efforts to pronounce the letter *v* elicited the following responses: /f/, and /ev/. A's responses for the sound of the letter *y* were /wh/, /wha/, and /wah/. The sound for the letter *j* was /ch/.

Section II

This section consisted of giving the names and sounds of the vowels.

1. *a e i o u*
2. *a e i o u*
3. *a e i o u*
4. *ĭ ŭ ĕ ă ŏ*
5. *ē ō ī ā ū*

For line one, A was asked to give the names of the five letters. For all four trials, there were no errors. For line two, A was asked to give the short vowel sounds. The results were as follows:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | Knew only short *a* |
| Post-Test May 1969 | — | Knew only short *a* |
| Pre-Test September 1969 | — | None Correct |
| Post-Test May 1970 | — | Knew *a, i, u* |

For line three, A was required to give the long sounds of the vowels. He knew all the long sounds for each test trial.

For line four, the tester gave the short vowel sounds and the student was required to point to the appropriate letter on a stimulus card which was set before him. The results were as follows:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | Knew only short *e*<br>(The tester believes this was purely a guess) |
| Post-Test May 1969 | — | None Correct |
| Pre-Test September 1969 | — | None Correct |
| Post-Test May 1970 | — | All Correct |

For line five, the tester gave the long vowel sounds and the student was required to point to the correct letter on his stimulus card. A had no difficulty and obtained correct scores for all trials.

Section III

The consonant blends and digraphs listed below comprise the next section of the Project's Diagnostic Test.

*st cl ch fr gr tw th sm wh pl bl sw sh br dr fl tr sn sp*

A's scores were as follows:

| | | |
|---|---|---|
| Pre-Test September 1968 | — | None Correct |
| Post-Test May 1969 | — | Knew *fr* and *ch* |
| Pre-Test September 1969 | — | None Correct |
| Post-Test May 1970 | — | Knew *ch, fr, bl, sh,* and *fl* |

The blends and digraphs that A knew, for example, the *ch* digraph, were known only in the context of a word, for example, *chick*. A had difficulty detaching the initial sounds of words to give the blend or digraph sound in isolation.

Section IV

The last section required A to reproduce the alphabet in sequential order—first using upper case letters and then using lower case letters. The results were as follows:

| | Upper Case Letters | Lower Case Letters |
|---|---|---|
| Pre-Test September 1968 | Did not know *G, I, J, N, M, O, P, Y* | Did not know *f, q, y, z* |
| Post-Test May 1969 | Did not know *H, I, M, P, R* | Did not know *f, g, k, l, q* |
| Pre-Test September 1969 | Did not know *N, P, Q, Y* | Did not know *f, g, h, i, m, r, z* |
| Post-Test May 1970 | Did not know *Q, Y* | Did not know *f, g* |

A mixed upper and lower case during all four trials of the test. For example, in the pre-test of 1968, A knew the upper case letter representation for *F* but did not know the lower case representation. Therefore, he used the upper case for both parts. This procedure was repeated for other letters. Also, A worked very slowly. Although A knew most of the letters of the alphabet, in both upper and lower case, at the end of the school year 1970, he still could not master *Q, Y, f* and *g*.

*Gates-MacGinitie Reading Test*

The last test in the battery was the Gates-MacGinitie Reading Test, a formal test consisting of two subtests, one in vocabulary and the other in comprehension. The Gates-MacGinitie was administered at the beginning and end of each academic year. The results were as follows:

| | B Form 1 | B Form 2 |
|---|---|---|
| Pre-Test September 1968 | | Vocabulary—13 items correct out of 48 attempted. Grade Score 1.4<br><br>Comprehension—2 items correct out of 33 attempted. Grade Score (No Score) |
| Post-Test May 1969 | Vocabulary—23 items correct out of 48 attempted. Grade Score 1.9<br><br>Comprehension—6 items correct out of 34 attempted. Grade Score 1.3 | |

| | B Form 1 | B Form 2 |
|---|---|---|
| Pre-Test September 1969 | Vocabulary—19 items correct out of 48 attempted. Grade Score 1.6<br><br>Comprehension—19 items correct out of 34 attempted. Grade Score 2.5 | |
| Post-Test May 1970 | | Vocabulary—29 items Correct out of 46 attempted. Grade Score 2.5<br><br>Comprehension—24 items correct out of 33 attempted. Grade Score 3.1 |

There is no question that during the pre-test in 1968, A guessed many of the answers. Although he had finished most of the items in both the vocabulary and comprehension parts of the test, his total number correct out of the total number attempted was extremely low. In fact, A attempted 48 items in the vocabulary section but had only 13 correct answers. Further, A attempted 33 items in the comprehension part of the test and had only two correct answers.

The analysis of the Wepman Auditory Discrimination Test showed that A had the greatest difficulty with words having a final consonant change. This pattern reinforced itself in the Gates-MacGinitie Reading Test. For example, A circled the word *chill* next to the picture showing a bird and having the following words: *chirp, first, chill* and *sharp*. On another vocabulary item, A circled the word *brace* next to the picture showing a bracelet and having the following words: *bracelet, brace, bravery* and *bramble.*

Although this test battery generated only a small part of the "data bank" of information on A, it was, nevertheless, an important source of information.

It was ascertained from all the data that A's area of known included the Subskills in the Cognitive-Perceptual Basic Skill area while his area of nearly known and unknown included Subskills in the Language Analysis Basic Skill area.

Therefore, the instructional treatments were initially in the Cognitive-Perceptual Basic Skills, since evidence indicated that A was not frustrated by material in this area. A continued with individualized treatments over an extended period of time. Some of the tasks in the Cognitive-Perceptual area included putting jigsaw puzzles together, connecting dots to construct pictures or listening to tapes of stories. Each of these activities made up part of an instructional treatment, and each was administered using, in turn, the Instructional Settings of Teacher-Student, Student Self-Instruction and Student-Student (Parallel). When A had shown that these treatments engaged him over a period of time, i.e., when he had experienced success, the personalization phase of instruction began. The personalized treatments introduced material from the Basic Skill area of Language Analysis, an area previously difficult for A. His progress in these treatments was recorded as follows:

**Treatment**

Date: Monday, February 2, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 211 | 5424 | Tape and Worksheet for Initial Consonant /d/ |

A worked with two other boys during this taped lesson of the initial consonant /d/. A did not know the name or sound of this particular letter. The boys were given sets of earphones so that they would not disturb each other or the other boys in the classroom. Each boy worked individually in a Test-Response Mode with an Auditory Input and a Motoric Response Output (marking).

A, however, annoyed the other boys by looking at their papers and ridiculing them when they made an error. He refused to let either of the boys look at his paper and when the boys attempted this, A became very angry.

Because of this behavior, the teacher decided to change the Instructional Setting to Teacher-Student.

Date: Tuesday, February 3, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 211 | 1445 | Sight Words (Flash Cards) |

The teacher flashed sight words that A needed to learn. A repeated each word and then wrote it on his paper. A repeated each sight word and recorded it on a tape recorder. While using the tape recorder, A developed a greater awareness and concern about his errors.

During the next week, a staff member worked with A. During this time, it became apparent that A concentrated more when working on this type of instruction. Because of this success, A began to work next in the Instructional Setting of Student Self-Instruction.

Date: Monday, February 9, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 211 | 2144 | *My Puzzle Book* |

A's reading seems to have improved. He has a tendency, however, to complete the work in as little time as possible. This may be due to his low frustration level. During the time that A was working in *My Puzzle Book* he had one knee on the seat of his chair and was standing on his other foot. As he was listening to the tape, he was swaying back and forth. When he was unsure of an answer, he would laugh and gesture nervously.

Although the material was challenging for A, he was able to cope with the work and contain himself in the Instructional Setting for more than ten minutes.

A, nevertheless, preferred to work with a tape recorder. This strategy will be utilized in the next instructional session.

Date: Tuesday, February 10, 1970

| WHAT | HOW | MATERIALS |
|---|---|---|
| 211 | 1425 | Tapes and Worksheets for initial consonants /j/ and /d/. |

The teacher replayed the tape for the initial consonant /d/ and A (who had already listened to this tape) had no difficulty. When he was required to print the letter, he did so with confidence. The tape for the initial consonant /j/ was then replayed. Each time A was required to print the letter *j*, he did so with greater confidence.

Apparently A is finding more comfort in this style of instructional presentation. He will be kept on taped instruction to learn the other letters of the alphabet that he did not know in the diagnostic testing.

This strategy proved successful for the remainder of the semester and A's responses became more enthusiastic. He enjoyed listening to taped instruction and found greater comfort and greater success at each session. Even when he taped his own reading, he wanted to be certain that he made no mistakes. When he did make a mistake, he knew how to erase and retape. A insisted on reading his selections over until he felt they were perfect.

A was beginning to be aware of initial consonant sounds. His attempts at pronunciation became better, and this heightened his interest.

When success had been apparent for a period of time, the teacher felt it was time to change the Instructional Settings from Student Self-Instruction and Teacher-Student to Student-Student (Parallel) and then to Student-Student (Interactive). This personalization of instruction initially frustrated A, but he eventually began to cope with the change. A was teamed with another boy and played a consonant game. The boys worked harmoniously together and A showed improvement, i.e., he was more tolerant of his own and the other boy's mistakes. Apparently, A could now cope with this type of Instructional Setting.

It was noted that A's behavior in the classroom was not as immature as it had been at the beginning of the year. He seemed more confident, although he occasionally ridiculed his peers when they made mistakes.

Both the teacher and staff member believe that A's immaturity is an extension of his inability to read and, therefore, a manifestation of his feelings of inadequacy. Hypothetically, when A gains even more confidence in his ability to read, his immature habits will diminish.

## Summary

A lacked Basic Skills in Language Analysis. This was shown in the diagnostic testing as well as through staff and teacher observations. His perception of letters was very poor. More often than not, he would insert an entirely different letter for the original and subsequently distort the word he was attempting to pronounce. This guessing was seen in his test taking procedure. Work was given in the Cognitive-Perceptual areas, Basic Skill 1, as a prerequisite for Language Analysis.

It was found that A would work most effectively in a teacher-student relationship. It was observed that A would concentrate more on what he would do in this Setting than in a total group. In addition to this preferred Setting, A preferred the Auditory Sensory Modality

Input. He functioned much better when he heard rather than saw something.

Eventually A began to function in the Instructional Settings of Student Self-Instruction and Student-Student (Parallel and Interactive). He has shown that the more confidence he develops in reading, the less immaturity he exhibits. He has shown a growing ability to comprehend certain sounds and transfer these to words. He has also shown that he is capable of discovering and correcting his own mistakes. His teacher believes that A will continue to improve his reading skills and therefore, also improve his behavior.

## CHAPTER V

## IMPLICATIONS FOR COMPUTER ASSISTED INSTRUCTION

### *INTRODUCTION*

The purpose of the following chapter is to explore the use of electronic data-processing equipment in relation to the Taxonomic Instruction Project. Although the major focus of discussion focuses on high-speed computers, much of the material is also applicable to the remote equipment currently available to the educational establishment. Since the Project has not yet had an opportunity to avail itself of computer facilities, a sizeable proportion of the data presented deals with projected possibilities rather than with experience.

In general, all discussion centering around computer usage must address itself to two major areas of concern. The first deals with the specific technical requirements which are imposed on any project by the hardware and software characteristics of the equipment. The second concerns those aspects of any given project which can best be served through computer usage. In approaching the inclusion of technological frameworks in projects whose major thrust is toward classroom management and teaching programs, it is necessary to maintain a delicate balance between the mechanical functions fulfilled by the machinery, and the aesthetic and artistic elements essential to good teaching techniques. In this sense, none of the following discussion implies a limitation of choice on the part of the teacher in favor of *absolute* machine usage. Rather, the ability of the computer to process and manipulate masses of often unrelated data is viewed only in terms of offering the classroom teacher and project staff member a tested framework within which the choice of optimally successful materials and strategies is maximized.

The materials have been organized into five sections, each section dealing with a unique type of computer usage relative to the Taxonomic Instruction Project. Section 1 develops the particular bookkeeping, coding and data reduction functions which computers impose on their users. Thus, it is a relatively generalized discussion using examples drawn from the Taxonomy but applicable wherever such equipment is utilized in social and behavioral disciplines. Sections 2 through 5 examine those areas of the Taxonomic Instruction Project which can best be served by mechanical rather than human instrumentalities. It is quite evident that as the project explores and utilizes the computer's potential, many of the areas indicated will require modification and extension. Also, it should be noted that although the Taxonomy has been applied primarily to emotionally disturbed students, the Chapter itself views the Taxonomy in terms of general school application. As a matter of fact, one of the major contributions of computer usage is the expansion of limited programs to larger populations.

### *SECTION 1: COMPUTER*

The most critical element in all computer usage is the necessity to view any problem in terms of a series of finite interrelated logical steps. Neither in the preparation of software (programs) nor in the creation of systems is it possible to approach computer operations in terms of gestalt. Since much of the teacher-student relationship does function on the basis of gestalt, it is necessary to translate that gestalt into a series of single characteristic units acceptable to machine usage. By no means does this imply that a teacher must be a programmer to gain maximum value from the technology at hand. However, it does mean that each teacher must be able to supply the programmer and the computer technologist

with all of the steps involved in arriving at teaching decisions.

In a manner of speaking, the computer introduces a framework of discipline even in those areas where aesthetics and open-choice are the normal methods of procedure. It is quite possible that the individual teacher may be unaware of the sequence of steps, the relative importance of various decisions, etc. Such quasi-mathematical evaluations can be made by the computer itself. However, under no circumstances can the computer anticipate or project teacher and student variables which have not been recognized and isolated in advance.

This should be a particularly valid approach for the Taxonomic Instruction Project, since, in its very essence, the Project attempts to determine optimal strategies and material usage on the basis of individual student characteristics. All that the computer framework adds, therefore, is a functional methodology for recognizing procedures and techniques which are already a part of the Project's theoretical construct.

The discipline imposed by computer usage falls into three major categories: 1) *comparability;* 2) *observation;* and 3) *evaluation.*

*Comparability* means the use of single terms to describe single units. Further, no unit may be described by more than the one term assigned to it. On the surface, this may seem like a straight-forward and rather simple-minded requirement. However, it should be recognized that terminological clarity is not always characteristic of the behavioral disciplines. Thus, the meaning of individual terms is often a function of a particular theoretical framework rather than agreed upon common usage. With the introduction of computerization, each working term must be reviewed in order to establish absolute precision, at least within the confines of the Project. While this may appear tedious at the outset, in the long run such terminological normalization adds to the clarity of the theoretical positions developed through the Project.

*Observation* means the framework within which teachers and staff approach the choice of materials and strategy relative to teaching programs. As in the case of terminological precision, observational frameworks must be made comparable from individual to individual and from task to task. Although the Taxonomy provides guidelines for relating materials and strategy to particular personality characteristics and reading debilities, it has not yet established a unique and all encompassing vocabulary for delimiting the nature of the choices made.

The word observation may be slightly confusing since in common education parlance, it relates to the actual process of the teaching program. In the case of computer applications, the observational framework should be brought into play long before the program achieves any functionality in the classroom setting. Through this process, two major goals may be achieved. On the one hand, it is possible to develop a body of evidence which, after processing, will yield information concerning the mechanisms by which classroom teachers and staff members arrive at programmatic decisions. On the other hand, it will direct the attention of each individual teacher to those procedures which they themselves think are important in making choices. Admittedly, choice mechanisms are implicit in all lesson plans and structured programs. Nevertheless, the individual practitioner often functions at an almost subconscious level. Standardization of observational terminology and frameworks should serve to make these mechanisms explicit.

Listed below is a series of possible formats which should serve to direct the attention of classroom teachers to the characteristics of individual students and general classroom conditions which tend to influence the nature of particular teaching sessions. By no means is the list exhaustive; it is included only to serve as an example of the kind of objectification made possible through computer usage. It should be noted that the required scale

evaluations deal with the teacher's perceptions concerning the individual child. Although it is possible to change the range of the evaluation scales by an expansion or diminution of scale points, this still leaves undetermined the precise value of each point. In the context below, it is recommended that a five point scale be used.

+2 = a child who scales at the upper level of the class in the teacher's estimation

0 = a child who conforms to the class average in the teacher's estimation

−2 = a child who scales at the lower level of the class in the teachers's estimation

−1,+1 = a child who lies somewhere between average and extreme levels in the teacher's estimation

It may seem strange, in the midst of a discussion concerning terminological and observational precision, to submit a scale whose mathematical points appear to lack arithmetic clarity. However, what is important is to develop a system which mirrors the actual mechanisms used by classroom personnel rather than to develop a mathematical model which, although easily measurable, does not conform to the existing reality of the classroom. Therefore, the above scale attempts to conform to the ways in which most teachers arrive at decisions concerning individual personality characteristics.

Except for testing conditions, very few situations demand arithmetic objectification when the teacher decides whether the child is functioning *on, above* or *below* average levels and makes choices accordingly. While the scheme developed above does not serve to evaluate the criteria used from teacher to teacher, it does provide a framework for relating the nature of choice to the teacher's *notion* of a child's characteristics. In the long run, it is the teacher's notion which determines almost all lesson planning. The best result a new program or approach such as the Taxonomy can expect is to sharpen the classroom teacher's ability to observe the relationship between specific student traits and successful lessons.

Ultimately, the data obtained from such observation will serve a number of purposes. As has already been mentioned, the observation directs the teacher's attention to classroom and student characteristics which are of concern in making choices. With the gathering of a sufficient amount of such data, it may be possible to develop student typologies and classroom profiles and to relate these profiles to specific successful programs. By no means is it suggested that the teacher develop each lesson plan through the use of such observational frameworks. This could easily lead to information *overkill*. Rather, the teacher should be able to provide the Computer Center with a wide range of information during the first few weeks of the class year. This data would then serve as a baseline for determining individual and class progress. In the best of all possible computer worlds, the relationship between progress and previously evaluated classroom profiles would help the teacher to determine whether each educational milestone was being achieved within a reasonable time limit and by a limited proportion of the class.

The final framework imposed on the Taxonomy is *Evaluation*, which area introduces the most mathematically oriented procedures. Assuming that comparability and observation have been successfully instituted, the function of evaluation is to measure: 1) the various forms of decision making and content/strategy relationships that emerge from specific situations, and 2) the achievement of *success* in terms of uniquely stated objectives, movement through milestones, rates of learning acceleration, task performance on standardized tests, etc. Since the Taxonomy deals primarily with youngsters having identifiable reading debilities, part of the evaluation procedure must be the measurement of those

debilities at the initial input stage reflected against standard school populations. In a sense, the computer task is to measure the ratio differences for entry and exit placement, using each youngster as his own baseline. Given the special nature of the population under treatment, it may be misleading to measure progress only in terms of previously established norms; this is one of the major reasons for establishing the baseline relative to each student. Also, the evaluation process can be conceived of as the measurement bookkeeping phase of the Project since it provides channels through which the educational debits and credits can be evaluated for each child.

In summary, the most important contribution that computer usage makes in relation to educational programs, projects and procedures is the imposition of discipline onto areas of teacher and staff functioning. There is no question that sophisticated use and development of machine approaches is likely to develop new techniques. Nevertheless, the computer's ability to handle masses of detail makes it possible to alert educators to those techniques which they have been utilizing without the benefit of the conception of those techniques in terms of system rather than purely in terms of action. From the point of view of the Taxonomy, the computer could be a partner to the theoretical frameworks in producing conscious choice relative to clearly defined conditions.

## *SECTION 2: THE TAXONOMY AS A CODING SYSTEM*

The Taxonomic Instruction Project uses a coding system as a springboard which attempts to characterize all of the potential strategies available in the area of reading instruction as well as a classification of educational materials relative to essential school characteristics. In short, the Taxonomy is a coding system that has been developed to facilitate choice of material and strategy combinations. Given the current state of the computer art, the above element of the Taxonomy readily lends itself to the most basic computer function, i.e., data storage and retrieval.

Regardless of the sophisticated uses to which second and third generation computers are put, they still retain their initial ability of storing masses of data which would otherwise be unavailable to the normal user. In the case of the Project, the storage question is of particular importance since, in addition to standard materials in the field of education, every individual lesson plan may be subject to the Taxonomy's coding system. At present, lesson plans, tapes, worksheets, etc. are coded on 5x8 index cards and filed. As in all contemporary communication systems, it is not too difficult to envision a point at which the physical energy output necessary to move paper will far outweigh the time available for educational choice and performance. Luckily, the computer stands ready to take up the storage-challenge. Assuming that coding terminology meets the criterion of comparability, every lesson within the framework of the Project can be translated to computer addresses. This is certainly true in terms of storing already existing materials.

However, it is in the area of retrieval that the Project can best be served. A major problem of teachers and staff has been to review their lessons in terms of originality, applicability and diversity. Of course, part of the problem lies in the newness of the Project and the limited number of units utilized. However, a second problem relates to the difficulty in isolating specific elements in a card-index system. The potential ability of the computer to output lesson plan bibliographies, materials lists, previously utilized plans and programs, etc. makes it an ideal instrument for facilitating future programmatic choice.

Of course, the Project will have to develop a series of questions growing out of the coding systems already developed, through which each user can address the computer. However, in this very process, there is the potential to sharpen utilization of the coding

system since it becomes necessary to arrive at an agreement concerning the format through which the coding system will function. Ultimately, the Taxonomy user should be able to draw on a computer index for both content and strategy which have been subjected to prior testing under specific conditions. This area will be more fully discussed in the section dealing with Research and Evaluation.

## *SECTION 3: THE TAXONOMY AND CLASSROOM MANAGEMENT*

The use of the Taxonomy within the framework of standard class procedures introduces a new element of classroom management to the already heavy demands made on the teachers by normal classroom procedures. Because of the emphasis on individualization and personalization of instruction, the Project imposes on the teacher the burden of controlling various groupings within the structure and not simply viewing the class as a single unit. While such an approach may lead to long-range advances in terms of student reading skills, the fact of the matter is that the Project should be ready to supply the classroom teacher with as much help concerning classroom management and bookkeeping as is structurally possible. In this area, computerization represents a major gain. Coupled with its data storage potential, the computer functions as an excellent management aid in terms of testing previous experience and making choices relative to proven success. For teacher usage, the following five categories can be developed: 1) classroom record keeping; 2) availability of materials; 3) relative positions of individual students; 4) choice of content; and 5) choice of strategy.

Added to the general flow of records inherent in every educational environment is the considerable body of information required by the Project. The assumption that use of the Taxonomy can accelerate individual reading levels demands a continuous flow of testing and milestone feedback, if only to substantiate the claims. It is not inconceivable that the Project will eventually have to design its own test instruments that are geared to special content/strategy units in order to keep up with individual development relative to unique student typologies. In short, the Taxonomy may have to create its own teaching system. If the classroom teacher is placed in the position of maintaining records for each student and each lesson unit, the burden may eventually outstep the potential value of the approach. On the other hand, simple record-keeping forms which are turned over to a computer staff would offer the dual advantage of minimal bookkeeping and instant or periodic feedback. Given the computational ability of the equipment, it is also possible to correlate the evaluation measurements growing out of the above bookkeeping with other aspects of the student's performance, including non reading areas. This will be discussed more fully in the section on Research and Evaluation.

Together with the bookkeeping overload, every teacher faces the problem of materials choice. The ranges of equipment, audio-visual aids, creative and play materials, programmatic suggestions, bibliographies, etc. have become so vast, a characteristic of all contemporary communication fields, that the teacher is hampered. Further, few training institutions devote much time to the technical requirements necessary for handling information retrieval, despite the fact that they tend to overload their students with paper output. Consequently, the inclusion of computer storage and retrieval facilities within the Project framework can add the following three elements: 1) large scale bibliographic storage; 2) content/strategy-specific annotated lists; and 3) basic training in the handling and use of retrieval systems. There has already been some discussion of the first two items in terms of the data storage capacity of the computer and the opportunity to include taxonomically coded items for ultimate teacher choice. However, the training step requires some explanation.

The Taxonomy implies additional training even for experienced classroom teachers, since the imposition of a coded framework is not a characteristic for most classroom teachers. Accordingly, there is every reason to relate the system of the Taxonomy to computer retrieval methods when training potential users. The result would be a unified conception of the Taxonomy that utilizes the computer as a natural part of the total scheme. Ideally, taxonomic training should begin in the pre-teacher period; it would not be amiss to include some instruction on the specification-language required to elicit information on the computer file.

Coupled with the general bookkeeping procedures growing out of the Project is the need to characterize the relative placement of each student within the suggested milestones of the program. Unlike the use of standardized tests where each student is measured against a pre-tested standard population, absolute measuring points have not yet been developed. Nevertheless, the teacher must know whether the individual student is living up to the potential implied by the program. Such an evaluation grows out of a set of interrelated variables depending upon previous experiences, the youngster's own pre- and post-taxonomic rate of development, the relationship between content and strategy, etc. In addition, the modality preferences suggested through testing instruments and observation should be validated against actual experience. The teacher should and must use personal observation as the first point of reference. However, substantiation of complex relationships can be immeasurably aided through the computations made possible by electronic equipment. Long-range observation is not sufficient in day-to-day functioning. The teacher may arrive at overall conclusions concerning the child's development but the computer supplies information concerning his rate of development at any given point in the program.

Both the choice of content and the choice of strategy depend in large measure on availability. In the best of all possible educational worlds, utopian at present, both elements would be unique for each student depending on his special characteristics. Aside from the question of which materials and strategies are best suited theoretically in a given situation is the manner in which the teacher arrives at particular choices. Availability, within a computer framework, has already been discussed. Growing out of the question of availability is the matter of teacher preference and training. The large scale capacity of the computer makes it possible to annotate materials and strategy relative to teacher preference as well as prior success, student familiarity, administrative time, prestige of equipment, etc. Thus, both the implicit and explicit values, out of which teacher choice grows, can be built into a computer coding system. In a sense, the computer framework allows for the recognition of the fact that the unique nature of the individual teacher may be as crucial an element in the success of a program as is the complex of materials and the thrust of the strategies.

## *SECTION 4: RESEARCH AND EVALUATION*

In discussing the uses of research and evaluation relative to the Taxonomic Instruction Project, it is important to keep in mind a quasi-cybernetic conception of large scale institutions as closed system mechanisms. It should be assumed that within the framework of any given educational project or program, each discrete action and each element of input information affects the relationships of the whole. Further, effective functioning demands that as an individual completes a series of actions geared to accomplishing a specific goal (or goals), he can expect feedback concerning the effectiveness of his actions and resultant changes.

For the Project, the use of computers can help in developing a hyman cybernetics

system in which the results of an action, the changes in given conditions and the unachieved aims are presented in a form readily available for instructional decisions. Assuming that all of the elements of comparability, observation and management (discussed above) have been achieved, the Project may view itself as a closed operational mechanism in which channels for input, analysis and output have been created.

There are three major directions through which research and evaluation can be made operational: A) descriptive profiles (typologies) of characteristic classes and students; B) measurement and predictability of programmatic "success;" and C) relationship between content/strategy and specific student variables.

All three lines of development are closely interrelated, and proper computer usage would demand the collection of a full data pool which would then serve as an analytic base for the above. To clarify, programmatic choice depends on class or individual characteristics; success is measured in terms of expected achievements through specific program channels; class and individual typology is functionally determined by reaction to specific programs.

Before discussing these items further, it should be pointed out that although the capacity of contemporary computers is, for all intents and purposes, limitless, the same cannot be said for their users. There is always the danger of either demanding more information from the individual teacher or staff member than he is capable of producing, or loading him down with more information than he is capable of using. This in no way implies inadequacy on the part of the human practitioner. On the contrary, the good teacher is constantly selecting materials and approaches on the basis of observation, current classroom conditions, personal style, past experience and, most important of all, sympathy and intimacy with his students. Thus, the teacher as a recording device is able to eliminate unimportant or transient items, whereas the computer must review and evaluate both the critical and the incidental input unit. With this word of caution, this section of the chapter undertakes to outline possible frameworks within which computer technology can facilitate the three major channels of research and evaluation outlined above.

### A. Individual and Class Typology

In functional terms, classroom behavior and management can be viewed as the result of a combination of identifiable characteristics. These may include both simple classroom demographics, such as the size and sexual composition of the class, ethnic balance, age range, etc. as well as complex psychological factors such as nervous characteristics, hostility, etc. They also include such physical conditions in the classroom as available equipment, materials and the like. The question which the computer might answer is whether or not it is possible to identify specific classroom types on the basis of the complex variable interrelationships which exist in every teaching situation. In a sense, this is an extension of the concepts of the Taxonomy from the individual to the group.

At present, the Taxonomy assumes that it is possible to achieve optimal results, even with disturbed or severely reading-retarded children, if one can tailor a program which matches content/strategy choice to individual characteristics and modality preferences. The gauge of the success of each individual teaching unit is the quantity of *engagement* which results, as well as the residual increments for the engaged student.

Under present urban school conditions, the opportunity for developing individual programs is severely limited even if we are dealing with only a reading-retarded population. Once the Project has passed out of the experimental stage, it will either have to package program-units for given student types or be applied only in limited situations. Beyond this structural shortcoming, however, is the fact that even with packaged units, the average

teacher must still confront the problem of total programming. Therefore, the challenge is to determine whether or not a class complex can be characterized in terms similar to those applied to the individual student.

Just as the computer can help to mathematically substantiate the efficacy of specific content/strategy units with individual student types, the same approach can be used in relation to individual class types. Mathematical and statistical languages are certainly available, assuming that there is sufficient input data to satisfy the requirements of factor analysis, analysis of variance, regression analysis, etc.

Perhaps even more important within this framework is the matter of determining just which individual and class characteristics a teacher must identify in order to function adequately. As has already been suggested, neither time nor working conditions allow the individual educator the luxury of being aware of and manipulating all of the variables in the classroom environment. More importantly, such manipulation may not only be unnecessary but, in the long run, a colossal waste of valuable time. If the teacher were appraised of the critical variables and attendant courses of action, he would apportion his time more efficiently without getting involved in an endless examination of classroom and/or individual characteristics, which, while academically intriguing, might be functionally unimportant. The same comment would help for those characteristics which are critical in delineating the nature of the individual student.

Should the Project decide to follow such an analytic course of action, it would have to impress the necessity of describing classroom characteristics early in the school year on teachers and staff. This chapter has already dealt with some of the possible research formats. Although writing the analytic programs is admittedly an extremely complex procedure, the gains would be enormous if it were to lead to the establishment of 1) a limited set of individual and class types, and 2) a framework of minimal characteristics each teacher must recognize and isolate in order to deal best with potentially successful teaching units. *(See Appendix—for areas from which these characteristics might be developed.)*

### B. Evaluation of Success Factors

Any approach to notions of success within the educational framework implies an attempt to measure factors which are often the result of subjective decisions. Although it is possible to assign absolute and comparable mathematical values to standardized test scores, the same objectivity is *not* applicable to the measurement of success in the case of individualized program units. Nevertheless, feedback requirements demand that both the student and the teacher have a sense of movement relative to their mutual involvement in the learning environment, since the lack of a sense of movement can lead to utter frustration even under the best of circumstances. Short of completely objective evaluation scales, it becomes necessary to turn to each student and utilize his entry levels in given programs in terms of base lines.

Within the parameters of the Project, there are at least two major areas in which evaluative decisions must be made, *engagement* and *residual increments.* The matter of *engagement* requires two measurement channels, one dealing with time and the other with behavior change. The time factor involves questions of attention span relative to various forms of educational activity, production continuity through various modalities and the like. In order to determine ratios of change, it is necessary to describe each student in terms of the time requirements indicated. Quite evidently, techniques for such measurements will have to be refined. Nevertheless, the information flow resulting from the comparison of content/strategy units relative to student types and the upgrading or downgrading of the

individual student's ability to be engaged over time should ultimately add a most important element in choosing proper programs. Further, when the approach of the Taxonomy is viewed in terms of pre-teacher training, decisions reached through notions of time become additional tools in directing the prospective teacher's attention toward the type of student change which is desirable.

*Residual increment* implies two major measurement channels, one dealing with the specific goal of a program unit, and the other one dealing with the general change occurring in the youngster's task performance. In both cases, the student's performance must be used for baseline and entry level. As far as the specific goal is concerned, the assumption of the Taxonomy must be that areas of reading ability are defined prior to the Project's choosing specific content/strategy units. Whether this results from standard tests or Project-created tests is immaterial, since the ultimate computer analysis is concerned with the ratio of change for each student relative to his own performance rather than with his placement within a standard population. However, even in the latter case, it is possible to measure success if the concern is the youngster's own progress in the standard population rather than his achievement of predetermined levels.

The measurement of the program's success in terms of task performance outside the specific goal need not constitute a major problem. All that is necessary is a full battery of tests dealing with performance areas outside the unique goals of the Taxonomy. Under any circumstances, it is advisable to test a reading retarded or emotionally disturbed population in terms of as many areas of the classroom behavior as is possible. Here again, the student should be used as his own base line for ultimate measurements.

In summary, the evaluation segment of the Project should involve both the notions of engagement and residual increment. The framework of engagement encompasses the notions of time behavior change, and the framework of residual increment encompasses both the specific goal orientation of a given content/strategy unit and the general task requirements of the classroom.

### C. Choice of Content and Strategy

It would seem that the choice of content and strategy would be fairly automatic once all of the steps outlined above have been carried out. In mechanical terms, all the teacher would need to do is input the characteristics which are critical in determining a student or class type, and the computer will output an index or bibliography of content/strategy units which have been used in relation to that particular type. Based on the evaluation data already contained in the computer files, this index would be accompanied by a mathematical (number-oriented) analysis of the success of each unit. The teacher then needs to choose those units with the highest success rating. Although a given unit may have the highest success rating, the computer is not in a position to evaluate the specific personal preferences and idiosyncracies which are operative at the point when the teacher is ready to make a choice. Under no circumstances should it be assumed that machinery can usurp the prerogatives of the teacher in so far as style, aesthetics, sense of the dramatic, personal preference, etc. are concerned.

Although computer usage in research and evaluation allows for the indexing of content/strategy units, the characterization of individual and class types and the analysis of teaching unit success ratios, only the teacher and the student are in a position to determine the methods and the mechanisms with which they feel most comfortable. The computer is ideally equipped to present the teacher with all of the possibilities that have been utilized, together with an objective description of the success of each one; only the teacher is

equipped to choose that approach which he feels will be most conducive to a fruitful interaction between himself and the student.

*SECTION 5: SIMULATION AND TRAINING*

In a sense, the most sophisticated uses to which the Taxonomic Instruction Project can put computers involve the whole area of teacher training and the creation of model classrooms within which the functions of the Taxonomy can be reviewed and refined. If one accepts the theoretical assumptions of the Project concerning direct relationships among individual students classroom characteristics and content/strategy units, then it is possible to conceive of mathematical models in which these relationships have been translated into computer-acceptable terms. On the assumption that the research component discovered above has been carried through, computer-simulated model classrooms would reflect the actual learning and development patterns reported as a result of particular programmatic approaches. However, even without such research and evaluation, it is possible to establish theoretical classroom models based either on frameworks suggested in general educational literature by specific educational theorists or built around sets of questions suggested by the teaching curricula of educational training institutions. In short, whether the models result from empirical evidence, teacher and administrative observation, or unique theoretical positions, the ultimate purpose for developing such models is their use as training tools, especially for pre-teachers.

In effect, the Taxonomy suggests three stages of model development: 1) a typology of "average classes;" 2) expected rates of growth and change relative to the above typology; and 3) the manipulation of variables imposed on the above typology.

The creation of an average class typology grows out of an analysis of variable interactions dealt with in the Taxonomic Instruction Project. Many of the characteristics necessary for such models have already been discussed in the preceding pages. The important factors to be considered pertain to the issue of determining whether unique class composition can be related to predetermined ranges of teaching programs. Even in the case of emotionally disturbed classes, it is possible to conjecture unique sets of characteristics. Ultimately, the importance of such models lies in the fact that once minimal descriptive factors have been isolated, the teacher is able to plan a good deal of his year's work on the basis of an early understanding of his class type. From a teacher training point of view, the model has the further virtue of allowing the student-teacher to compare various class types with reference to their differences. Further, it is possible to discuss objective conditions together with the types of teaching programs having high success potential.

Once the above models have been established, the next question concerns the type of expectations teachers and students can have regarding learning progress. Admittedly, the Taxonomy is program-oriented. On the other hand, it is quite clear that two students exhibiting the same characteristics and being taught through the same programming units, may achieve different results. The question is whether such differences are purely random, grow out of separate sets of classroom characteristics or result from individual characteristics that are unmeasured or unmeasurable. Once sufficient input data has been derived through the evaluation phase of computer usage, there is a chance to solve the above dilemma. It should be noted that one of the factors in determining a classroom model must be the character and personality of the teacher. From the student-teacher's point of view, it may be a way of showing him that specific variable clusters can critically change the nature of the student's progress, even though the same teaching channels have been used. Thus, an all-boys class and an all-girls class may perform quite differently, a male teacher and a

female teacher may achieve different results, etc. For both the teacher and the student, the question of progress can be most important in terms of feedback. In addition, educational decisions can be defined within the framework of a mathematical construct based on this expectation of progress.

The final stage of model building, and by far the most sophisticated, involves the manipulation of each classroom type through the introduction of particular variables into an already existing framework. In every teaching situation, there arrives a point at which one of the parties involved asks "What would happen if I did x?" With sufficient prior data storage and computer analysis, there is a chance to answer the x-question. This proposition holds true not only for a total class model, but for the individual child as well. Unlike the previous two simulation phases which are oriented toward the total class unit, variable manipulation can be directed at any unit whose framework encompasses all the functional characteristics necessary.

The important consideration in such manipulation becomes the choice of maximum strategies. A spin-off effect is possible from viewing the results of changing strategies based on personal choice, subjective teacher reaction, etc. Although it would seem that the inclusion of subjectivity within this discussion is somewhat obtrusive, it has been indicated previously that the object of any computer application is not only to deal with *ideal* conditions, but also to take into account actual teaching procedures. In a sense, the thrust should be not to dehumanize the teacher through computer replacement but to humanize computer applications by including those behavior patterns which, although not necessarily the most efficient at any given moment, are, nevertheless, a major element in every fluid behavioral situation. This assumption is particularly true in the case of the Taxonomy where part of the overall approach involves experimentation in order to *get through* to the students for whom the most common experienced standard has been failure.

Once the three levels of simulation have been achieved, the teacher-trainee is in a position to exploit the fullest potential of the Taxonomy. Through a series of questions directed at the computer, the trainee can explore those areas of student-teacher relationship which he considers either most important or about which he knows the least. The professor of education can present the student with classic classroom confrontations and compare his answers with those of the computer model. In short, all of the empirically developed evidence contained in computer memory becomes a tool for the training of new teachers.

## SUMMARY

As we noted at the beginning of this chapter, a view of computer applications in behavioral sciences involves two major channels: the general operational characteristics of the computer which must be introduced into any given project, and the requirements of that project which can best be served through computer usage. As far as the former is concerned, the greatest contribution computer usage makes to any program is the imposition of discipline, whether it be in terminology, observational frameworks, comparable evaluation procedures, etc.

From the point of view of the Taxonomy, the computer satisfies the coding requirements which are perhaps one of the major contributions of the Project. Further, the great storage potentials of modern generation computers allows for a wider range of taxonomic coding than is possible through standard methods of paper and card files. This aspect is also of benefit in that teacher and staff choice is facilitated, since specific questions can be directed at the computer in reference to materials and strategies.

Finally, the computer allows for a vast framework of research and evaluation,

classroom bookkeeping, the establishment of milestones or progress points as functions of specific class and individual types and the establishment of computer models which allow for infinite manipulation of variables.

In all, the use of the computer in the Taxonomy increases the potential for storage, research, manipulation and teacher instruction.

# GLOSSARY

## GLOSSARY

*A*: the designation used to indicate an *accustomed* manner of behaving or receiving information. For the target population, these habituated styles of behavior are usually inappropriate in a classroom setting in that they often stem from endogenously or exogenously caused deficits in the child's emotional, social, educational and/or physiological development.

$A^{P:}$ the designation used to indicate an accustomed and preferred manner of behaving or receiving information that is appropriate in that it conforms to at least one seven digit taxonomic instructional treatment. This habituated pattern can form the basis for the individualization of instruction.

*AESTHETIC EXPRESSION:* a component of the Basic Skill category of the Taxonomy which deals with enhancing the creative abilities of the student.

*BASIC SKILLS:* the skill areas that can be used to describe reading behavior, mastery of which is necessary in successful reading. Basic Skills comprise the first component of a taxonomic treatment, and include one of the following areas: (1) Cognitive-Perceptual, (2) Language Analysis, (3) Comprehension, (4) Study Skills and (5) Aesthetic Expression.

*BASIC SUBSKILLS:* the areas of reading behavior that are components of, and more specific than, the Basic Skills. Basic Subskills comprise the second component of a taxonomic treatment. Each Basic Skill is broken into three to seven Basic Subskills, a listing of which is found on page 4 of this manual.

*COGNITIVE-PERCEPTUAL:* a component of the Basic Skill category of the Taxonomy that deals with primary intellectual and perceptual functioning such as understanding sequential time relationships or being able to discriminate basic shapes.

*COMPREHENSION:* a component of the Basic Skill category of the Taxonomy that deals with the ability to understand what is read by referring to cues embedded in the reading content.

*CONSONANTS:* a Basic Subskill of Language Analysis (a Basic Skill) that deals with the ability to label and give the sounds of consonants and to use this skill in decoding words.

*CONTENT:* the first three components of an instructional treatment (Basic Skill, Basic Subskill and Sequential Level) which comprise the *What* of instruction.

*CONTEXT INFERENCE:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability to infer the meaning of a sentence, paragraph or story when the meaning is not explicit.

*CRITICAL ANALYSIS:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability to evaluate the information, ideas and opinions implicit using knowledge or insights that have been acquired through experience.

*DATA BANK:* any information which can be used by the teacher to develop effective instructional treatments. Sources of data include, among others, cumulative files, teacher insights and objective and nonobjective evaluations of performances on standardized and nonstandardized tests.

*DETAILS:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability to select specific information from a sentence, paragraph or story.

*DIAGNOSTIC EVALUATION:* the process of determining the instructional strengths and weaknesses of a student in order to individualize and personalize instructional treatments. The diagnosis includes both formal and informal test instruments.

*DICTIONARY:* a Basic Subskill of Study Skills (a Basic Skill) that deals with the use of the dictionary for the purposes of locating and pronouncing words, syllabicating, learning the use of stress, diacritical marks, and syntax, and the selection of the appropriate meaning from a list of definitions.

*DIRECTIONALITY-LATERALITY:* a Basic Subskill of Cognitive-Perceptual (a Basic Skill) dealing with the left-right eye movements necessary for reading and the preferential use of one side of the body (laterality).

*DISTANT RESPONSE:* an incorrect answer to a test or other evaluative item that indicates minimal familiarity with the item or minimal ability to use the skill needed to arrive at the correct answer.

*E:* the designation used to indicate *emerging* patterns of behavior. E is deemed appropriate only if the emerging pattern is *expected-* or *unexpected-suitable.* If the emerging pattern is unsuitable, adjustments are made in the instructional treatment.

*ENGAGEMENT:* one of the criteria for success of an instructional treatment. It refers to a student's observable involvement in an instructional task.

*EXPECTED:* behavior which has been characteristic of a given student. This behavior may or may not be appropriate in an instructional situation.

*EXPECTED-SUITABLE:* behavior which is characteristic of a student and appropriate in an instructional situation. *Expected-suitable* behavior is a goal of indivualized instruction.

*EXPECTED-UNSUITABLE:* behavior which is characteristic of a given student but inappropriate in an instructional situation. This behavior is often evident when personalization of instruction begins.

*HOW OF INSTRUCTION:* the manner in which the content of an instructional activity is transmitted. The *How* of instruction comprises the last four components of an instructional treatment (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output).

*INDEX OF ENGAGEMENT:* the ratio of a pupil's involvement in instructional tasks in relation to total instructional time. This Index is used to assess the effectiveness of an instructional treatment for a particular student.

*INDIVIDUALIZATION:* the process by which the teacher, through diagnostic, evaluative and methodological procedures, pinpoints the combination of content and methods of presentation which are uniquely motivating for a particular child in a specific environment and at a specific time.

*INSTRUCTIONAL MODE:* the fifth component of an instructional treatment which relates to the presentation of the instructional material or instructional activity. There are nine options in Instructional Mode, including: (1) Play-Puzzle, (2) Play-Chance, (3) Play-Competition, (4) Test-Response, (5) Role-Playing, (6) Exploration, (7) Programmed Response, (8) Problem Solving and (9) Exposition. A description of these options appears on pages 14 through 17 of this manual.

*INSTRUCTIONAL SETTING:* the fourth component of an instructional treatment which relates to groupings of students in the classroom. There are eight options in Instructional Setting, including: (1) Teacher-Student, (2) Student Self-Instruction, (3) Student-Student (Parallel), (4) Student-Student (Interactive), (5) Teacher-Small Group and (8) Student-Total Group. Description of these options appears on pages 13 and 14 of this volume.

*INSTRUCTIONAL TREATMENT:* an instructional prescription for an individual student which is based on feedback from the student's data bank. Each instructional treatment is coded as a seven digit number, each digit representing one component of the Taxonomy.

*INTANGIBLE:* one of the three classifications devised by the project staff to categorize items 13 to 52 of the Gates-MacGinitie Vocabulary Test (Form C). A word is classified as *intangible* if it is impossible to make a visual representation of the meaning of the word. An example of a word assigned to this category is *absurd.* (The purpose of the classification system is to provide a framework for the analysis of pupil responses).

*KEY RESPONSE:* a correct answer to a test or other evaluative item. Analysis of a student's key responses reveals the area of *known* content which is used in the individualization of instruction.

*KNOWN:* the content area of instruction that a student is familiar with. This *known* area provides the reservoir from which material is chosen to individualize instruction.

*LANGUAGE ANALYSIS:* a component of the Basic Skill category of the Taxonomy that deals with the functional components of language, such as the use of phonic or syntactical elements in reading.

*MAIN IDEAS:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability to recognize the central idea or ideas in a paragraph or story.

*MAPS, GRAPHS AND TABLES:* a Basic Subskill of Study Skills (a Basic Skill) that deals with the ability to read and construct maps, graphs and tables.

*MEMORY SPAN:* a Basic Subskill of Cognitive-Perceptual (a Basic Skill) dealing with the ability to retain and reproduce meaningful units of information.

*MOST DISTANT RESPONSE:* an incorrect answer to a test or other evaluative item that indicates no familiarity with the item or the skill needed to arrive at the correct answer.

*NEAR-KEY RESPONSE:* an incorrect answer to a test or other evaluative item but an answer that shows that the student has some familiarity with the skills necessary to get the correct answer. The *near-key* responses reveal the *nearly-known* content from which material is drawn for the personalization of instruction.

*NEARLY-KNOWN:* the content area of instruction in which a student has borderline skills or familiarity. This *nearly-known* area provides the reservoir from which material is chosen to personalize instruction. This *nearly-known* area becomes *known* as skills are gained.

*OBJECTIVELY TANGIBLE:* one of three classifications devised by the project staff to categorize items 13 to 52 of the Gates-MacGinitie Vocabulary Test (Form C). A word was classified as *objectively tangible* if the meaning of the word could be visually represented. An example of a word assigned to this category is *church.* (The purpose of the classification system was to provide a framework for the analyses of pupil responses.)

*P:* the designation used to indicate the *priority* of pupil needs on the basis of exigency in order to develop a rationale for the decision making process.

*PERSONALIZATION:* the level of instructional treatments after individualization of instruction in which the child is gradually exposed to instructional treatments that are minimally frustrating and allow him to use his strengths to decrease his weaknesses. It is a process by which the child becomes less sensitive to frustrations generated in learning situations.

*PRE-CONDITIONING:* prescribing taxonomic treatments that remediate inappropriate instructional behavior that interferes with learning. This level of treatment is usually used when the student's behavior is serious enough to cause crises in the classroom.

*RECREATIONAL READING:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability and desire to read for personal pleasure. Recreational Reading carries the added component of being a means by which reading skills are practiced and expanded.

*REFERENCES AND TEXTS:* a Basic Subskill of Study Skills (a Basic Skill) that deals with the ability to locate needed information for projects, reports, special interests, etc.

*S:* the designation used to indicate an appropriate behavioral pattern that has a high degree of *stability,* i.e., yields *expected-suitable* behavior.

$S^C$: the designation used to indicate a behavioral pattern that is both *stable* and *closed. Closed* in this context refers to behavior that is task and situation bound. In the early stages of learning, this behavioral pattern is appropriate; if the closed

behavior persists, however, it is considered inappropriate since no transfer of learning can occur, i.e., the student cannot expand his repertoire of skills and information.

$S^F$: the designation used to indicate an appropriate behavioral pattern that is both *stable* and *flexible. Flexible* in this context refers to behavior that allows for the expansion of the pupil's repertoire of skills and information.

*SENSORY MODALITY INPUT:* the sixth component of an instructional treatment which relates to the modality through which instructional content is transmitted. There are seven options in Sensory Modality Input, including: (1) Kinesthetic, (2) Auditory, (3) Auditory-Kinesthetic, (4) Visual, (5) Visual-Kinesthetic, (6) Auditory-Visual and (7) Visual-Auditory-Kinesthetic. A description of these options appears on pages 17 through 19 of this volume.

*SENSORY MODALITY OUTPUT:* the seventh component of an instructional treatment which relates to the modality through which a student will respond in an instructional situation. There are five options in Sensory Modality Output, including: (1) No Response, (2) Motoric Response (gestures and movement), (3) Vocal Response, (4) Motoric Response (marking and writing) and (5) Vocal-Motoric Response. A description of these options appears on page 19 of this volume.

*SEQUENCE-RELATIONSHIPS:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability to recall and organize specific details of a sentence, paragraph or story in a sequential manner.

*SEQUENTIAL LEVELS:* the grade level equivalent at which a student is functioning in reading or the grade level at which reading material may be classified. The Sequential Level comprises the third component of a taxonomic treatment. This component is divided into six levels, including: (1) Grade 2 and Below, (2) Grades 2-4, (3) Grades 4-6, (4) Grades 6 and Above, (5) Ungradable and (6) Multi-Level.

*SIGHT VOCABULARY:* a Basic Subskill of Language Analysis (a Basic Skill) that deals with the ability to read words without extended analysis. A sight vocabulary is a reservoir of *known* words.

*SITUATIONALLY TANGIBLE:* one of the three classifications devised by the project staff to categorize items 13 to 52 of the Gates-MacGinitie Vocabulary Test (Form C). A word was classified as *situationally tangible* if the meaning of the word could be visually represented either as an expressive emotion or as a distinctive action, hence the subclassifications *situational-emotionally tangible* and *situational-performably tangible*, respectively. An example of a word assigned to the former

category is *sorrow* and to the latter category, *gossip*. (The purpose of the classification system was to provide a framework for the analysis of pupil responses.)

*SKIMMING:* a Basic Subskill of Study Skills (a Basic Skill) that deals with the ability to scan reading material rapidly in order to gain an overall impression of the content or to locate specific information within the content.

*SPEED AND ACCURACY:* a Basic Subskill of Study Skills (a Basic Skill) that deals with the ability to read with increased speed and comprehension.

*SPACE RELATIONSHIPS:* a Basic Subskill of Cognitive-Perceptual (a Basic Skill) dealing with the ability to locate objects in space and the ability to use concepts such as over, under, in, on, etc.

*STRATEGY:* a combination of Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output (the last four taxonomic components) that generates optimal student engagement over a period of time. A strategy indicates individualization of the *How* of instruction. Once a strategy can be found for a particular student, it can be consciously manipulated to personalize instruction.

*STUDY SKILLS:* the component of the Basic Skill category of the Taxonomy which aims to supply the student with a variety of techniques for gaining information.

*SUITABLE:* behavior which is appropriate for a given instructional situation. The criterion of appropriateness is optimal student engagement.

*SYMBOLIC DISCRIMINATION:* a Basic Subskill of Cognitive-Perceptual (a Basic Skill) that deals with the ability to discriminate the representation of objects, shapes or letters and the ability to correctly label the objects, shapes or letters.

*SYNTAX:* a Basic Subskill of Language Analysis (a Basic Skill) that deals with the ability to incorporate the meaning of individual words to arrive at the total meaning of a phrase or sentence.

*T:* the designation used to indicate the state of *transition* from one behavioral pattern to another, for example, from a $S^C$ (stable-closed) behavioral pattern to a $S^F$ (stable-flexible) behavioral pattern. If the transition period is prolonged, hence not consummated by a fully developed behavioral pattern, T is viewed in the negative sense and an alteration of instructional treatment is deemed necessary.

*TAXONOMY:* the classification system used to categorize the options available to the teachers or staff members when planning instructional treatments for individual students. The Taxonomy presently is composed of three components dealing with the Content of Instruction (Basic Skill, Basic Subskill and Sequential Level) and four components dealing with the transmission of this content (Instructional Setting, Instructional Mode, Sensory Modality Input and Sensory Modality Output).

*TIME RELATIONSHIPS:* a Basic Subskill of Cognitive-Perceptual (a Basic Skill) dealing with the ability to organize experiences in a sequential manner, such as using the concepts *first, next, last,* etc.

*UNEXPECTED:* behavior which is not characteristic of a given student. This behavior may or may not be appropriate in an instructional situation.

*UNEXPECTED-SUITABLE:* behavior which is not characteristic of a student but which is *suitable* in an instructional situation.

*UNEXPECTED-UNSUITABLE:* behavior which is not characteristic of a student and which is inappropriate for a given instructional situation. This type of behavior usually indicates that an instructional treatment is inappropriate for the student.

*UNKNOWN:* the content area of instruction that is unfamiliar to the student. This *unknown* area becomes *nearly-known* as skills are learned.

*UNSUITABLE:* behavior which is inappropriate for a given instructional situation. The criterion of inappropriateness is disengagement from the instructional task.

*VOWELS:* a Basic Subskill of Language Analysis (a Basic Skill) that deals with the ability to label and give the long and short sounds of the vowels and to use this skill in decoding words.

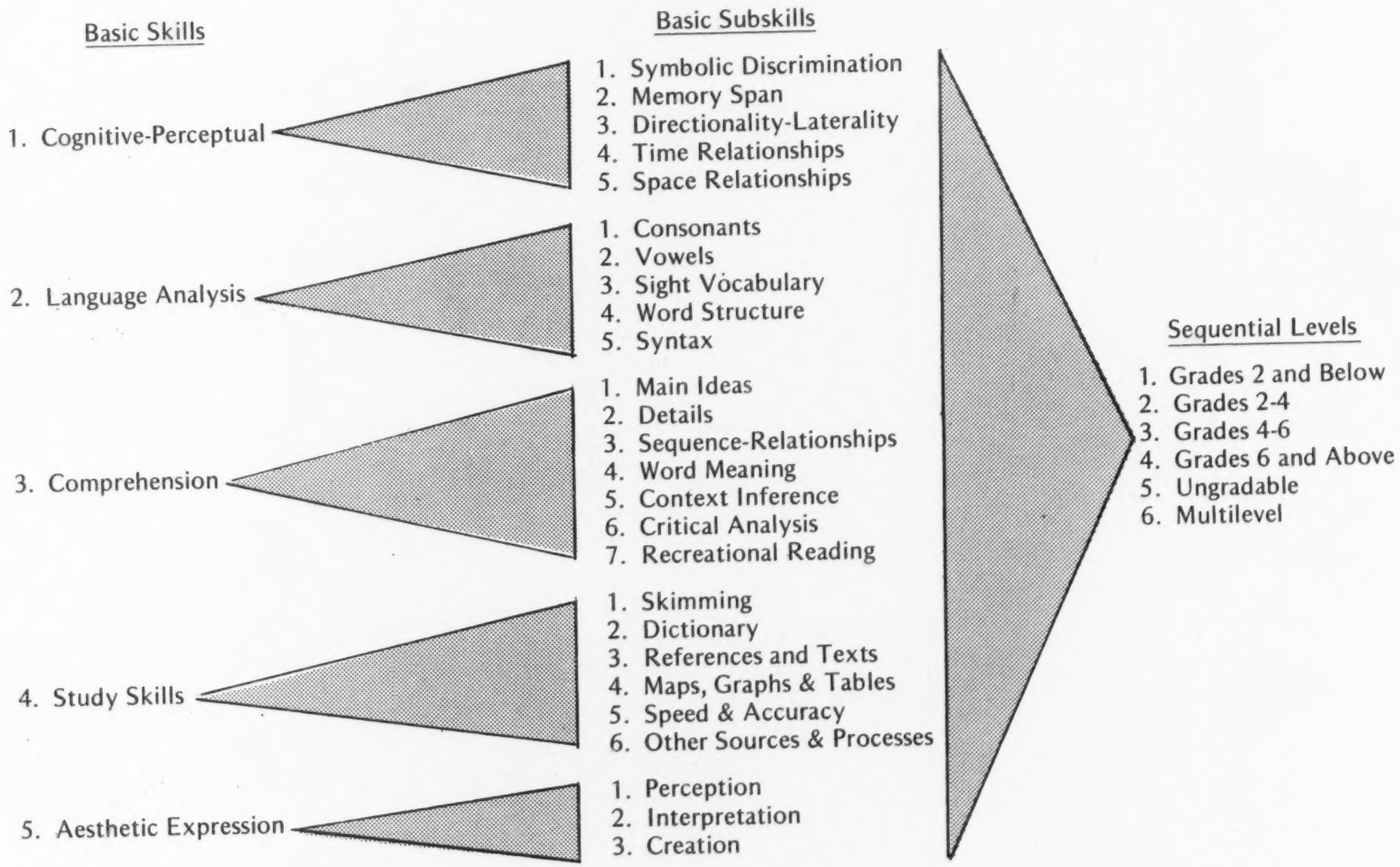
*WHAT OF INSTRUCTION:* the first three components of an instructional treatment (Basic Skill, Basic Subskill and Sequential Level) which comprise the content of the instructional treatment.

*WORD MEANING:* a Basic Subskill of Comprehension (a Basic Skill) that deals with the ability to arrive at the one correct meaning of a word in a particular context when several meanings are possible.

*WORD STRUCTURE:* a Basic Subskill of Language Analysis (a Basic Skill) that deals with the ability to use the parts of words that carry meaning to arrive at the meaning of whole words.

# APPENDICES

## THE WHAT OF INSTRUCTION



## APPENDIX B

### RESEARCH AND DEMONSTRATION CENTER TAXONOMIC INSTRUCTION PROJECT TEACHERS COLLEGE, COLUMBIA UNIV.

### THE HOW OF INSTRUCTION (Tentative Hierarchical Ordering)

| INSTRUCTIONAL SETTING | INSTRUCTIONAL FORMAT | SENSORY MODALITY INPUT | SENSORY MODALITY OUTPUT |
|---|---|---|---|
| 1. Teacher-Student | 1. Play-Puzzle | 1. Kinesthetic | 1. No Response |
| 2. Student Self-Instruction | 2. Play-Chance | 2. Auditory* | 2. Motoric Response (gestures & movement) |
| 3. Student-Student (Parallel) | 3. Play-Competition | 3. Auditory-Kinesthetic* | 3. Vocal Response |
| 4. Student-Student (Interactive) | 4. Test-Response | 4. Visual | 4. Motoric Response (marking & writing) |
| 5. Teacher-Small Group | 5. Role-Playing | 5. Visual-Kinesthetic | 5. Vocal-Motoric Response |
| 6. Student-Small Group | 6. Exploration | 6. Auditory-Visual* | |
| 7. Teacher-Total Group | 7. Programmed Response | 7. Visual-Auditory-Kinesthetic* | |
| 8. Student-Total Group | 8. Problem Solving | | |
| | 9. Exposition | | |

* A distinction between extrinsic and intrinsic auditory input is being made. Whenever the purpose is a self-monitoring auditory input, the letter "I" will follow the appropriate number.

## APPENDIX C

## CLASSROOM OBSERVATION ANALYSIS SHEET

Class _____ Teacher _____ Observer _____

Date _____ Period _____ Time_____ to _____

Taxonomy

Pupils Observed

| ITEMS | Basic Skills | Subskills | Seq. Level | Inst. Setting | Inst. Format | S.M. Input | S.M. Output | TIME | | | | | | | | | | | | | | | | TIME | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 2 | | | | | | | | | | | | | | | | 2 | |
| | | | | | | | | 4 | | | | | | | | | | | | | | | | 4 | |
| | | | | | | | | 6 | | | | | | | | | | | | | | | | 6 | |
| | | | | | | | | 8 | | | | | | | | | | | | | | | | 8 | |
| | | | | | | | | 10 | | | | | | | | | | | | | | | | 10 | |
| | | | | | | | | 12 | | | | | | | | | | | | | | | | 12 | |
| | | | | | | | | 14 | | | | | | | | | | | | | | | | 14 | |
| | | | | | | | | 16 | | | | | | | | | | | | | | | | 16 | |
| | | | | | | | | 18 | | | | | | | | | | | | | | | | 18 | |
| | | | | | | | | 20 | | | | | | | | | | | | | | | | 20 | |
| | | | | | | | | 22 | | | | | | | | | | | | | | | | 22 | |
| | | | | | | | | 24 | | | | | | | | | | | | | | | | 24 | |
| | | | | | | | | 26 | | | | | | | | | | | | | | | | 26 | |
| | | | | | | | | 28 | | | | | | | | | | | | | | | | 28 | |
| | | | | | | | | 30 | | | | | | | | | | | | | | | | 30 | |

Engagement Index (EI) = $\frac{\text{Engagement Time}}{\text{Total Observation Time}}$

KEY Item # = Engagement
R = Random Behavior
(N?) = Ambiguous Behavior

Circled Item # = Academic Digression
N = Nonengagement
T = Transition between tasks
X = Pupil's Absence

## APPENDIX C (1)

*THE OBSERVATION PROCEDURE*

**Explanation of Key**

This observation procedure should be used only if a planned lesson is in progress.

1. PARTICIPATION: Behavior that indicates student involvement in the task that has been assigned. Participation is recorded as a taxonomic *item* number in the appropriate interval boxes of the observation sheet.

2. NON-ENGAGEMENT: Overt behavior that indicates the student has removed himself from the assigned task: sleeping, doodling, talking, etc. Nonparticipation is recorded as the letter N in the appropriate interval boxes of the observation sheet.

3. RANDOM-BEHAVIOR: Behavior that indicates nonparticipation of the student as manifested by walking around the room. Random behavior is recorded as an R in the appropriate interval boxes of the observation sheet.

4. TRANSITION: Nonparticipation of student caused by termination of one task and the transition to another. This type of behavior is to be recorded as a T in the appropriate interval boxes of the observation sheet.

5. PUPIL'S ABSENCE: Absence from the room during observation is to be recorded as an X in the appropriate interval boxes of the observation sheet.

6. AMBIGUOUS BEHAVIOR: If the student's behavior is ambiguous, mark the interval with the symbol that is most relevant, but designate the beginning of ambiguity by a question mark. Continue the use of this symbol as long as the ambiguity exists. If the observer's hypothesis is disproved, re-mark the ambiguous intervals with the appropriate symbol. For example, if the observer tentatively assesses the child's academic behavior as manifesting nonparticipation, an N with a small question mark (N?) is to be recorded in the appropriate interval box.
   If ambiguity of behavior is not resolved, the tentative assessment is to remain on the record.

7. ACADEMIC DIGRESSION: Academic digression on the part of the child is viewed as a self-initiated activity that is relevant to the task that has been assigned. A different item number should be assigned to the academic digression and when recorded in the interval box, the item number should be circled: ((2)).

## APPENDIX D

## CATALOGUE CARD

C.F. *111*

Catalogue Number

| | | |
|---|---|---|
| *2* | *1* | *1* |

Retrieval Number

| |
|---|
| *211.1* |

Material Identification:

*Worksheet & Tape for initial consonant (b)*

Publisher:

*Staff made*

Description

*Dittoed worksheet with 20 fill-ins to accompany tape on initial consonant (b)*

| Method | Mode | Input | Output | Material Source |
|---|---|---|---|---|
| *1* | *4* | *6* | *4* | *0* |
| *2* | *4* | *6* | *4* | |
| *3* | *4* | *6* | *4* | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## APPENDIX E

## INDIVIDUAL AND CLASSROOM CHARACTERISTICS

*I. FOR EACH CHILD:*

**A. Academic Description**

1. Grade Placement
2. Transfer (within grade) or not
3. Ever have (same) teacher before, or not
4. Class level scale (scale 1-5: 1—advanced class on grade, 5—slowest class on grade)
5. Current reading level
6. Current arithmetic level
7. Overall teacher evaluation (scale 1-5, 1—bright or extremely capable)
8. Current numeric evaluation relative to subject being taught (scale 1-5)
9. I.Q. in terms of number and percentile (test specifics)
10. Placement on previous year's arithmetic and reading tests
11. Previous year's grade

**B. Physical Description**

1. Obvious defects (limbs, body)
   a. Manual handicap
   b. Visual handicap
   c. Auditory handicap
   d. Speech defect
   e. Obesity
   f. Other
2. Subtler Handicaps
   a. Ugly
   b. Dirty or smelly
   c. Raggedy
   d. Other

3. Standard Description

   a. Height

   b. Weight

   c. Age (in months)

   d. Vision

   e. Hearing

   f. Laterality

   g. Sex

   h. Ethnicity

   i. Primary language

   j. Secondary lauguage

**C. Teacher Observation**

1. Attention Span

   a. Time

   b. Subject

   c. Modality

   d. Individual/group/class—optimal group ratio to attention span

2. Personal Nervous Habits

   a. Interruption level

   b. Signs of boredom

   c. Nervous gestures: ticks, snapping fingers, etc.

3. Frustration Level

   a. Any failure (vs. cumulative failure)

   b. Frustration aroused by physical acts

   c. Frustration aroused by intellectual acts

   d. Private failure

   e. Public failure before class

   f. Public failure alone with teacher

   g. Cumulative effect—i.e., how many items must he fail before he feels frustrated and within what given period of time

4. Duration (of frustration)

   a. In or out of classroom

   b. How long does he brood?

   c. What is antidote for failure?
      – Success
      – Sympathy
      – Another activity
      – Nothing
      – Anything at all

5. Areas of Interest

   a. Neighborhood, family

   b. World of glamor (fashion . . . )

   c. Sports–participant

   d. Sports–spectator

   e. Gangs

   f. Academic studies

   g. Adventure

   h. Science

   i. Money and success, power

   j. Moving out of current environment

   k. Ethnic heroes or involvement

   l. General hero figures or autobiographies

   m. Mechanical objects

   n. Television

   o. Reading

   p. Construction

   q. Hobbies

   r. Others

6. Modalities (scaled as to competence and/or preference)

   a. Visual modality

   b. Auditory modality

   c. Kinesthetic modality

   d. Auditory Visual (any combination of the above)

   e. Task oriented

   f. Problem oriented

4. Duration (of frustration)

   a. In or out of classroom

   b. How long does he brood?

   c. What is antidote for failure?
      – Success
      – Sympathy
      – Another activity
      – Nothing
      – Anything at all

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   d. Sports–spectator

   e. Gangs

   f. Academic studies

   g. Adventure

   h. Science

   i. Money and success, power

   j. Moving out of current environment

   k. Ethnic heroes or involvement

   l. General hero figures or autobiographies

   m. Mechanical objects

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   o. Reading

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   i. Money and success, power

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   k. Ethnic heroes or involvement

   l. General hero figures or autobiographies

   m. Mechanical objects

   n. Television

   o. Reading

   p. Construction

   q. Hobbies

   r. Others

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   g. Adventure

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   n. Television

   o. Reading

   p. Construction

   q. Hobbies

   r. Others

6. Modalities (scaled as to competence and/or preference)

   a. Visual modality

   b. Auditory modality

   c. Kinesthetic modality

   d. Auditory Visual (any combination of the above)

   e. Task oriented

   f. Problem oriented

*II. SCHOOL FACTORS:*

**A. Description of Classroom**

1. Number of Students
2. Sex: number boys, number girls
3. Race of teacher
4. Sex of teacher
5. Number of adults in room (sex and role)
6. Classroom comfort, climate
7. Classroom furniture and facilities
8. Noise factor (near school yard)

**B. Special School Facilities**

1. Gymnasium (number gym periods per week)
2. Library
3. Study room
4. Language laboratory
5. General A-V facilities

**C. Administration**

1. Funds
2. Flexibility
3. Communication